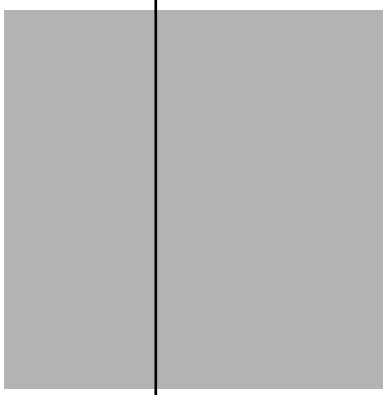
No. CP-UM-1583E

DIGITRONIK CPL COMMUNICATION SDC40A/40G

User's Manual



Thank you for purchasing the SDC40A /40G.
This manual contains information for ensuring correct use of the SDC40A /40G. It also provides necessary information for installation, maintenance, and troubleshooting.
This manual should be read by those who design and maintain devices that use the SDC40A/40G.
Be sure to keep this manual near by for handy reference.

Yamatake Corporation

RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment.
Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

REQUEST

Ensure that this User's Manual is handed over to the user before the product is used.

Copying or duplicating this User's Manual in part or in whole is forbidden. The information and specifications in this User's Manual are subject to change without notice.

Considerable effort has been made to ensure that this User's Manual is free from inaccuracies and omissions.
If you should find any inaccuracies or omissions, please contact Yamatake Corporation.

In no event is Yamatake Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

Introduction

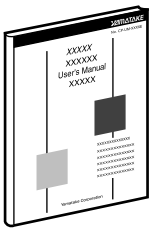
Thanks for the choice of the DIGITRONIK digital indicating controller SDC40A/SDC40G.
This instruction manual not only outlines the communication functions of the SDC40A/SDC40G, but also describes its wiring methods, communication procedure, communication data table, troubleshooting, and communication specifications.
The items required for the SDC40A/SDC40G communication functions to be properly used are given in this manual.
Persons in charge of design or maintenance of operation panels or equipment using the SDC40A/SDC40G communication functions should read this manual without fail.
Since the communication data addresses of the SDC40A differ from those of the SDC40G, refer to their relevant communication data tables.

PRECAUTIONS

- When the parameters of the SDC40A/SDC40G are to be changed frequently in communication, they should be written at addresses of RAM. The guaranteed write count in EEPROM is 100,000 times. Therefore, if data are frequently written at addresses of EEPROM, the guaranteed range is exceeded in a short time.
- Be very careful since the data in RAM are erased and the data in EEPROM are transferred to RAM if a power interruption should occur in the SDC40A/SDC40G.

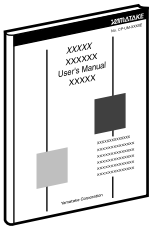
The Role of This Manual

In all, 2 manuals have been prepared for the SDC40A Read the manual according to your specific requirements. The following lists all the manuals that accompany the SDC40A and gives a brief outline of the manual: If you do not have the required manual, contact Yamatake Corporation or your dealer.



Digitronik Line SDC40A Digital Indicating Controller
User's Manual **No.CP-SP-1043E**

The manual is provided with SDC40A.
People who are involved in hardware design to build the SDC40A into a control panel and maintenance must read this manual.
This manual describes the outlines of hardware and controllers, installation/wiring, maintenance/checking, troubleshooting measures and the hardware specification.



DIGITRONIK CPL COMMUNICATION SDC40A/40G User's Manual
No.CP-UM-1583E

This manual is required reading for those using the CPL communications functions of the SDC40A.
This manual describes an outline of CPL communications, wiring, communications procedures and SDC40A communications data, how to remedy trouble, and communications specifications.

Configuration of this instruction manual

This instruction manual consists of the following eight chapters, in which the individual items are described.

1. **Communication functions**
   Communication functions and model numbers of the DIGITRONIK instruments.
2. **Wiring**
   RS-232C and RS-485 wiring methods to make communication between the DIGITRONIK instruments and other equipment.
3. **Setting**
   Setting for communication of DIGITRONIK instruments.
4. **Communication procedure**
   Communication procedure, message configuration, data read/write and signal timing.
5. **Communication data table**
   Table of various data addresses used for communication of DIGITRONIK instruments.
6. **Communication program for master station**
   Precautions for programming.
7. **Troubleshooting**
   Check points required if the DIGITRONIK instrument communication should not operate normally.
8. **Specifications**
   Communication specifications for the DIGITRONIK instruments.

Appendix
Code table and network configuration using the RS-232C/RS-485 converter CMC10L, input range code table and event code table.

Contents

5. Communication data table

6. Communication program for master station

7. Troubleshooting

8. Specifications

Appendix

1. Communication functions

- In the RS-232C system, this instrument is connected with one master station (also called a host computer as which a personal computer or the like is used) in the form of one to one.
  In this system, only one instrument can communicate with the master station.
  The "station address" must be set to make communication.

- In the RS-485 system, up to 31 instruments (see *1) can be connected with one master station. The “instrument addresses” are then used to identify mate stations for communication

- The communication procedure and format are in common to the both RS-232C and RS-485.

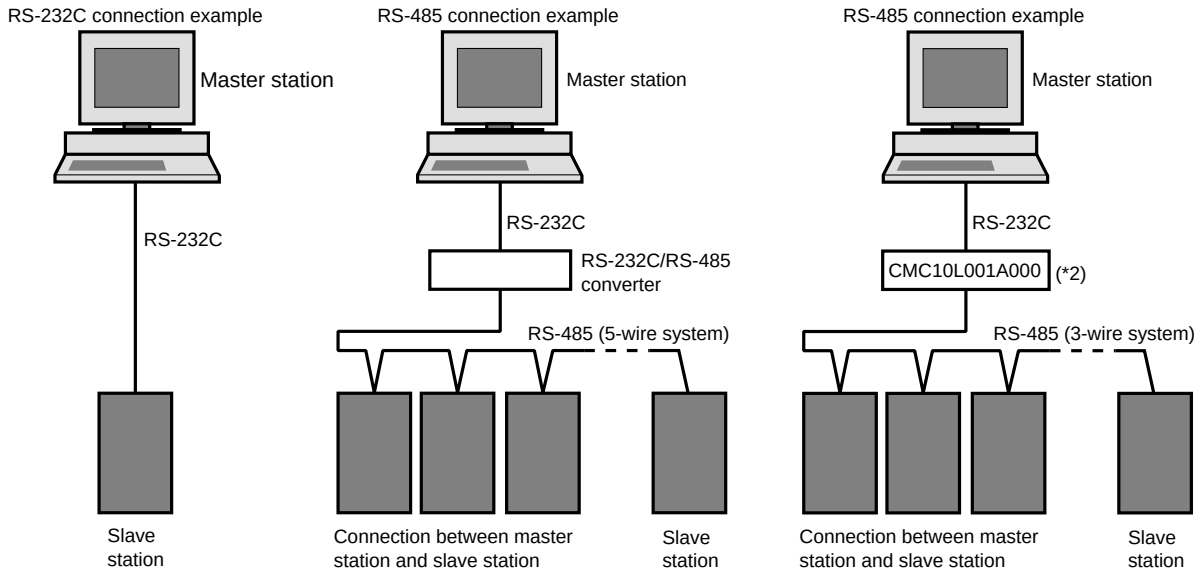
- The communication protocol and format conform to the RS-232C and RS-485 interfaces.

- When the following procedure is completed during communication, various data for the instrument can be read or written.
  (1)The master station (host computer) transmits a request message to a slave station (instrument)
  (2)The master station receives a response message from the slave station.

- Instructions from master station to slave station are classified into two types; “read” and “write”.

- The type of ready/write data can be optionally selected by “data address”.

- CPL (Controller Peripheral Link) communications network is the Yamatake Corporation's host-communications.



- The high-performance communication controller CMC410A102 is available for conversion between the RS-232C and RS-485 interfaces.

(*1) When the master station is an MA500 DIM or CMC410, it can be connected to up to 16 slave stations.
(*2) The CMC10L001A000 communication controller is an RS-232C/RS-485 (3-wires type) converter available from Yamatake Corporation.

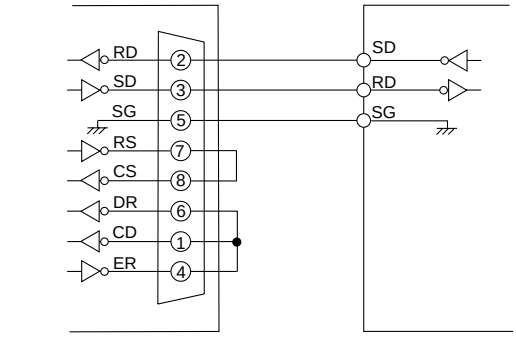
2. Wiring

2 - 1 RS-232C Connection

The DIGITRONIK instrument with the RS-232C communication function is wired for communication as shown below.

- **Connection with the master station in the form of 1 to 1.**

  This instrument is provided with three communication terminals (RD, SD, and SG). Data may not be output unless the other kind terminals of the master station side RS-232C interface are short-circuited as shown in the figure below.
  Usually, the pin array of the RS-232C connector of a personal computer, or the like is as shown below (Terminal mode). In a rare case, pins (2) and (3), (4) and (5), and (6) and (20) may be replaced with each other, respectively (MODEM mode).
  Check the RS-232C pin array by referring to the instruction manual for the host computer.



Example of connection using Yamatake Corporation CBL232FNZ02

Note

Cable catalog No. : CBL232FNZ02
(2m cable for RS-232C, 9-pin, D-Sub socket, contact - crimp style terminal)

- **RS-232C connector signals**

(9 pins) Example: IBM and compatibles

Pin No.	JIS Code	Name	Signal Direction Host-station
1	CD	DCD	←
2	RD	RxD	←
3	SD	TxD	→
4	ER	DTR	→
5	SG	GND	
6	DR	DSR	←
7	RS	RTS	→
8	CS	CTS	←

(25 pins) Example: PC-9800 Series

Pin No.	JIS Code	Name	Signal Direction Host-station
1	—	FG	
2	SD	TxD	→
3	RD	RxD	←
4	RS	RTS	→
5	CS	CTS	←
6	DR	DSR	←
7	SG	GND	
8	CD	DCD	←
20	ER	DTR	→

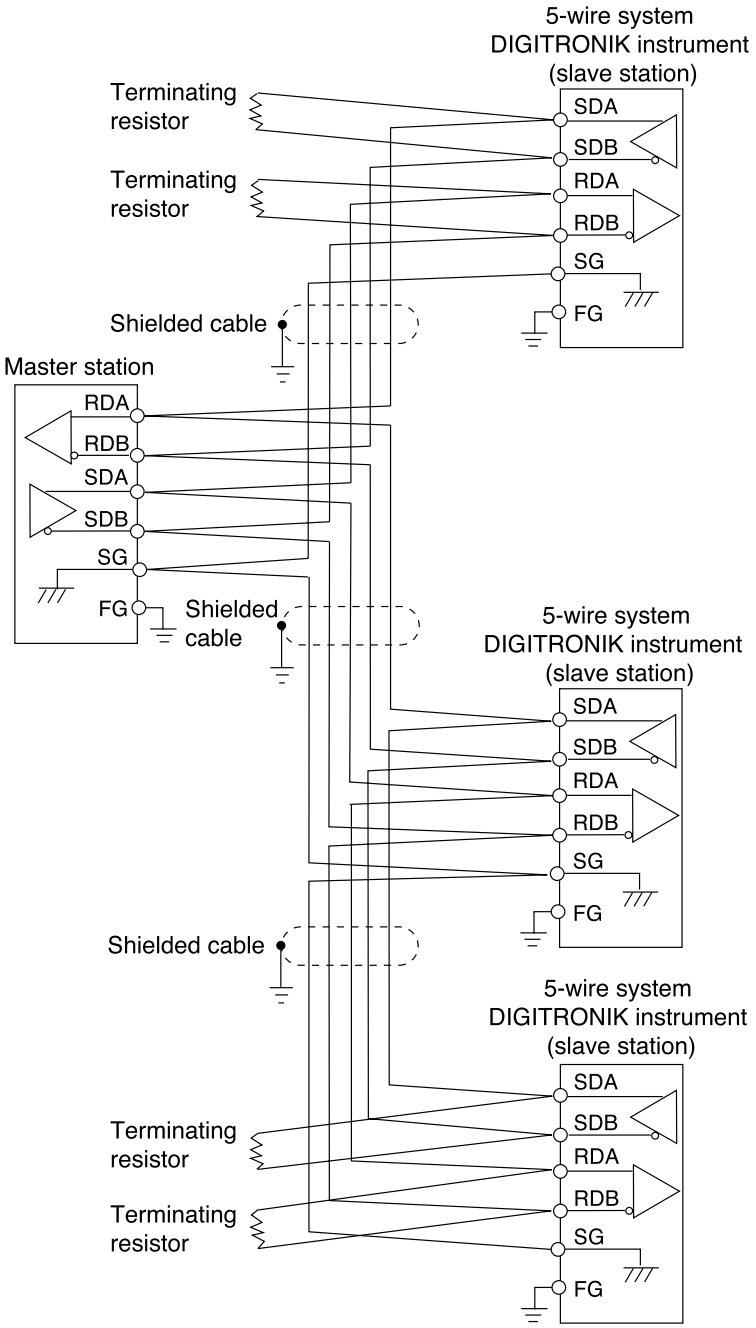
(14 pins) Example: PC-9821Ne

Pin No.	JIS Code	Name	Signal Direction Host-station
1	RD	RxD	←
2	DR	DSR	←
3	CD	DCD	←
4	CS	CTS	←
9	SD	TxD	→
10	RS	RTS	→
11	ER	DTR	→
13	SG	GND	
14	SG	GND	

2 - 2 RS-485 Connection

■ 5-wire system

When the DIGITRONIK instruments with the communication functions in compliance with the RS-485 are used in the 5-wires system, they are connected, for example, as follows:

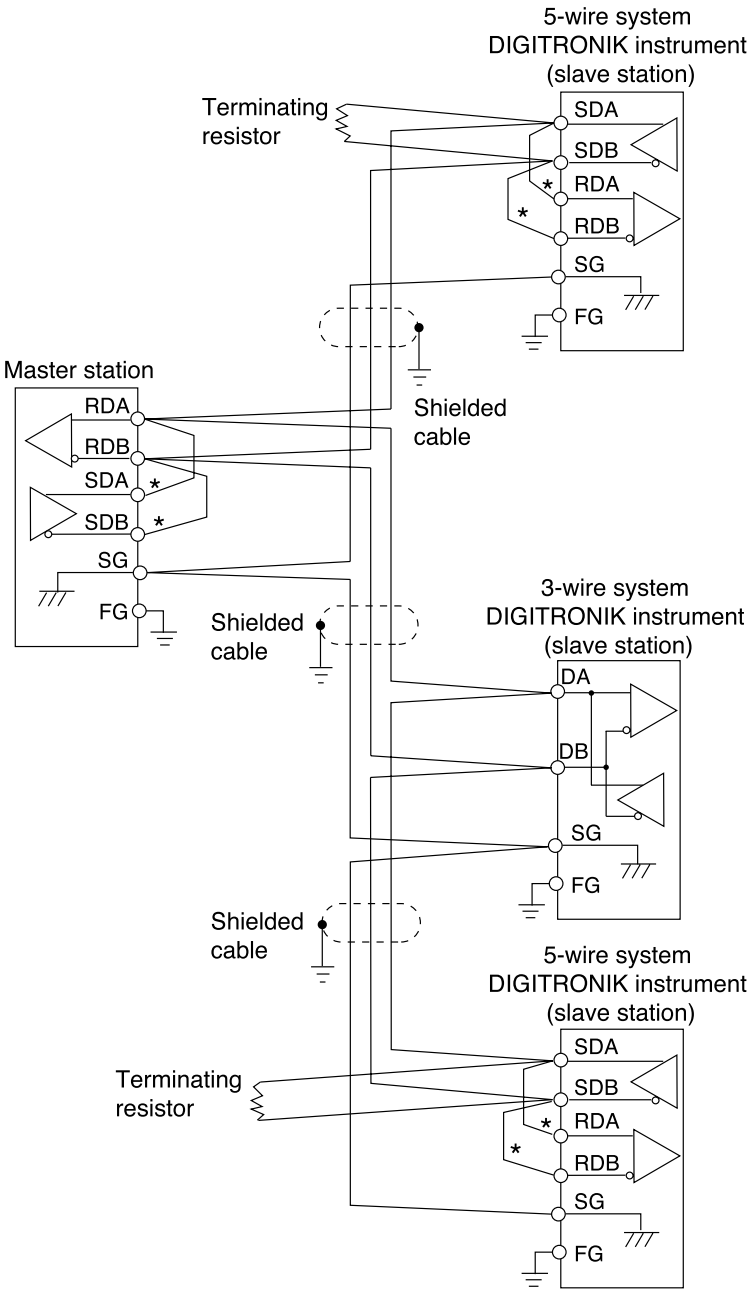


Connect two terminating resistors of 150Ω±5%, 1/2W min. to the instrument at each end of the transmission line. Also connect the shield wires to FG at one place.

In the 5-wires system, the Yamatake Corporationl CMC10L can be used as a converter in the master station. It can also be used as a converter in the slave station when the number of the slave stations is only one, but cannot be used as a converter in a slave station when two or more slave stations are used.

■ 3-wire system

The DIGITRONIK instruments with the communication functions in compliance with the RS-485 can also be used in the 3-wires system. An example of connection methods in such a case is shown below.



Connect one terminating resistor of 150Ω±5%, 1/2W min. to the instrument at each end of the transmission line.

Also connect the shield wires to FG at one place.

In the 3-wires system, the Yamatake Corporation CMC10L cannot be used as a converter in the master station or slave station.

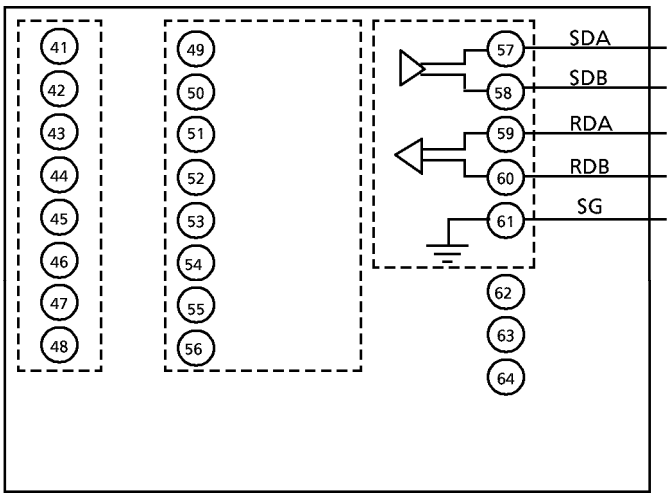
In an instrument equipped with only three RS-485 terminals, the asterisked (*) wiring is done internally.

2 - 3 Terminal Array of SDC40A/SDC40G

The communication terminal array of the SDC40A/SDC40G with the communication functions is as follows:

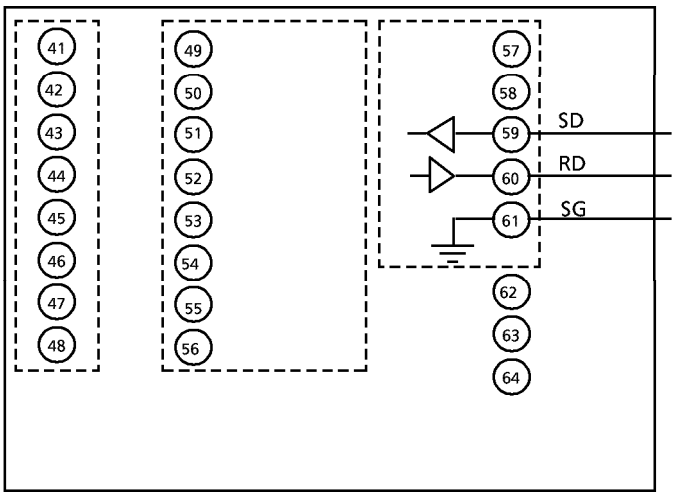
- Extension terminal array

In case of RS-485



Note) Connect the shield wires to FG at one place.

In case of RS-232C



3. Setting

3 - 1 SETUP Items of SDC40A/SDC40G

Code	Item	Setting at delivery from factory	Setting range
C84	station address	0	0 to 127
C85	Transmission speed	0	0 to 3

3 - 2 Initialize

Before starting communication, initialize the communication conditions for the DIGITRONIK instrument and master station.

■ Station address

Set a decimal number within address to the SETUP item C84 of the DIGITRONIK instrument. In the RS-485 system, set a different address value from the addresses of the other slave stations connected in multi-drop on the same transmission line.
Address 0 is set as an station address at delivery from the factory.
Since the communication function is not activated at address 0, be sure to set a value other than 0 to execute communication.

■ Baud rate / Character format

Set the baud rate / Character format to the SETUP item C85 of the DIGITRONIK instrument. At this time, use the same baud rate / Character format value as in the master station. "0" is set to C85 at delivery from the factory.
0: 9600bps, even parity, 1 stop bit
1: 9600bps, no parity, 2 stop bits
2: 4800bps, even parity, 1 stop bit
3: 4800bps, no parity, 2 stop bits

4. Communication procedure

4 - 1 Outline of communication procedure and messages

The outline of communication procedure, and the concept of message configuration are given in this paragraph.

■ Communication procedure

The communication procedure used is given below in simple expression.

(1) The master station transmits a request message to a slave station to designate the mate station for communication.

(2) The slave station processes the request message and executes read and write.

(3) Further, the slave station transmits a response message according to the contents of processing.

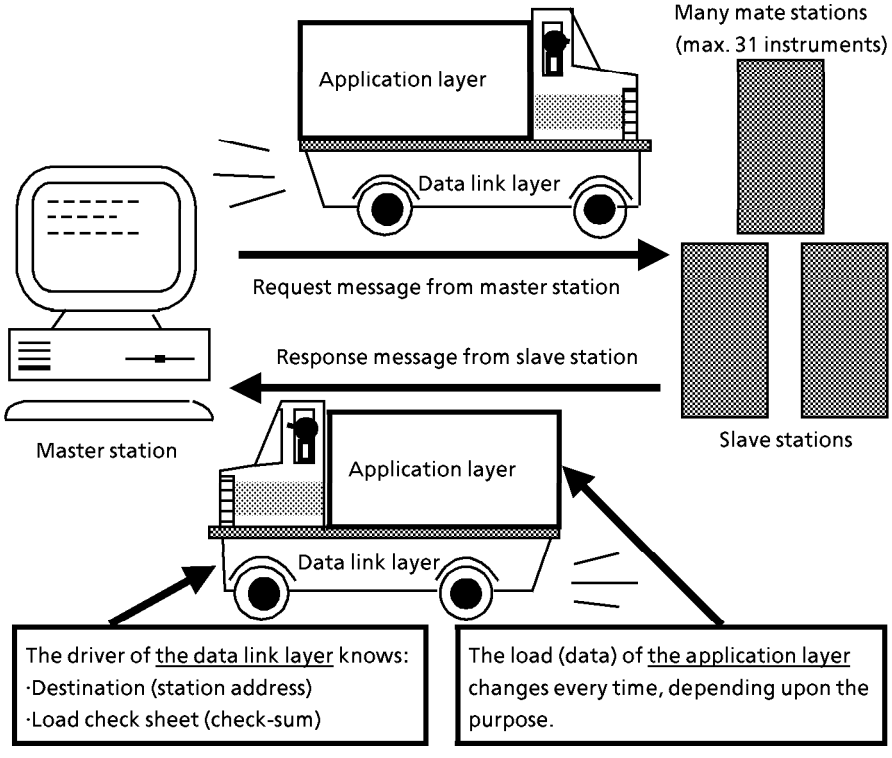
(4) The master station receives the response message and executes processing.

■ Configuration of message

One message consists of two layers as shown below. This is common to the request message from the master station and response message from a slave station.

- Data link layer
  - · This layer has the basic information required for communication.
  - · This layer has the destination of communication message and message check information.
- Application layer
  - · A layer for data read and write
  - · The contents change, depending upon the purpose.

The individual layers are detailed in the following items:



■ Definite examples

Definitely, the messages are as shown below.

● In case of read request

·Request message

STX	0	1	0	0	X	R	S	,	1	0	0	1	W	,	2	ETX	9	A	CR	LF

Data link layer　　Application layer　　Data link layer

·Response message

STX	0	1	0	0	X	0	0	,	0	,	4	2	ETX	9	4	CR	LF

Data link layer　　Application layer　　Data link layer

● In case of write request

· Request message

STX	0	1	0	0	X	W	S	,	1	0	0	1	W	,	5	8	ETX	5	A	CR	LF

Data link layer　　Application layer　　Data link layer

·Response message

STX	0	1	0	0	X	0	0	ETX	8	2	CR	LF

Data link layer　　Application layer　　Data link layer

The data link layer and application layer are detailed in and after the next paragraph.

■ Concept of data address

This instrument uses the concept of data address to facilitate reading or writing each intended data by addressing.

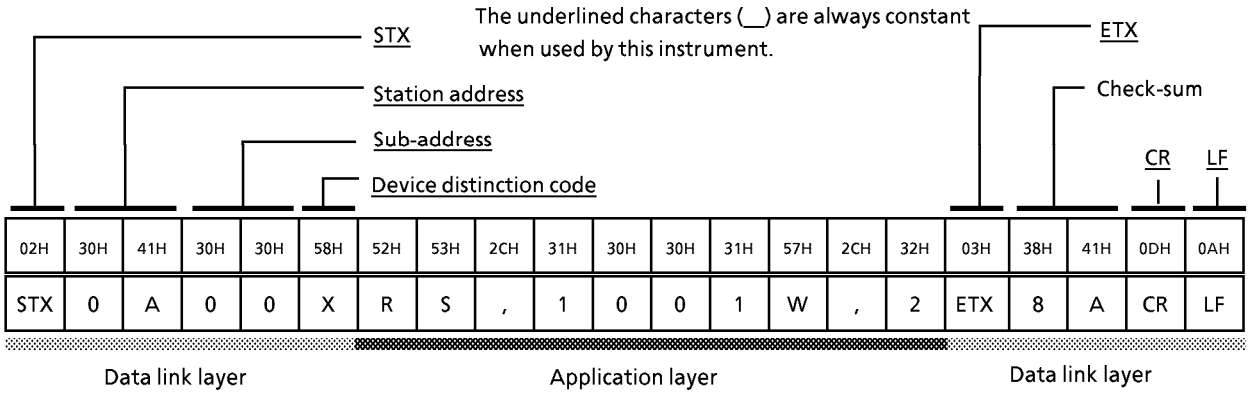
Data A	501W
Data B	502W
Data C	503W
:	:

For the actual correspondence between data and address, see the "Communication data table".

4 - 2 Data link layer

■ Description of data link layer

- The data link layer includes eight basic information for transmitting a message.
- The data link layers of a request message and response message have the same structure.



Each function of the data link layer is shown below.

● STX (Start of TeXt)

◆Role : Indicates the head of a message.

◇Description · Fixed at 02H.

· When the instrument receives "STX", it is identified as the first character of a new request message even on the course of any message.

● Station address

◆Role : Designates the destination instrument. Communication with one instrument designated is permitted.

◇Description · If 0 is set as a station address, the communication function is stopped.
Therefore, to make communication be sure to set an address value of 1 or more.

· 2 hexadecimal characters. For details, see the example.

· For the details of setting of the station address, see the"SETTING".

□Example : When the station address of the mate is 10:

(1) 10 (decimal) = 0AH (hexadecimal)

(2) When converted into character codes:
0 = 30H, A = 41H

(3) "0A" (30H, 41H) found in (2) is used as the station address.

◇Caution◇

- Note that the function of the station address differs absolutely from that of the data address of the application layer.

● Sub-address

◇Description: The sub-address is meaningless in this instrument. Be sure to set "00" (30H, 30H) as the sub-address in the same format as in the station address.

● Device distinction code

◇Description: The character code "X" (58H) or "x" (78H) only can be designated in this instrument.

● ETX (End of TeXt)

◆Role : Indicates that the application layer existed up to immediately before.

◇Description: Fixed at 03H.

● Check-sum

◆Role : A value to be used to check whether or not the message has been changed due to any error (such as noise) on the course of communication.

◇Description · Two hexadecimal characters

. The preparing method for the check-sum is as follows;

(1) The character codes of the message from STX to ETX are added byte by byte.

(2) The two's complement of the result of addition is taken.

(3) The above value is converted into character codes.

□Example : Description is given below, citing the example of the above request message on the preceding page.

(1) The character codes from STX to ETX are added byte by bytes. The one lower byte of the result of calculation is 76H.

(2) The two's complement of the result of addition is taken. The result is 8AH.

(3) The 8AH is converted into character codes. this value is used as the check-sum. The result is "8A"; (38H) and (41H).

For the conversion into character codes, see the example of the station address (on the preceding page).

◇Caution◇ • The check-sum in the request message can be omitted, but no check-sum is then included in the response message. The check-sum should not be omitted to assure the proper reception of a message.

● CR and LF (Carriage Return/Line Feed)

◆Role : Indicates the end of a message.

◇Description · "CR" is (0DH), and "LF" is (0AH).

. Be sure to use CR and LF in pair.

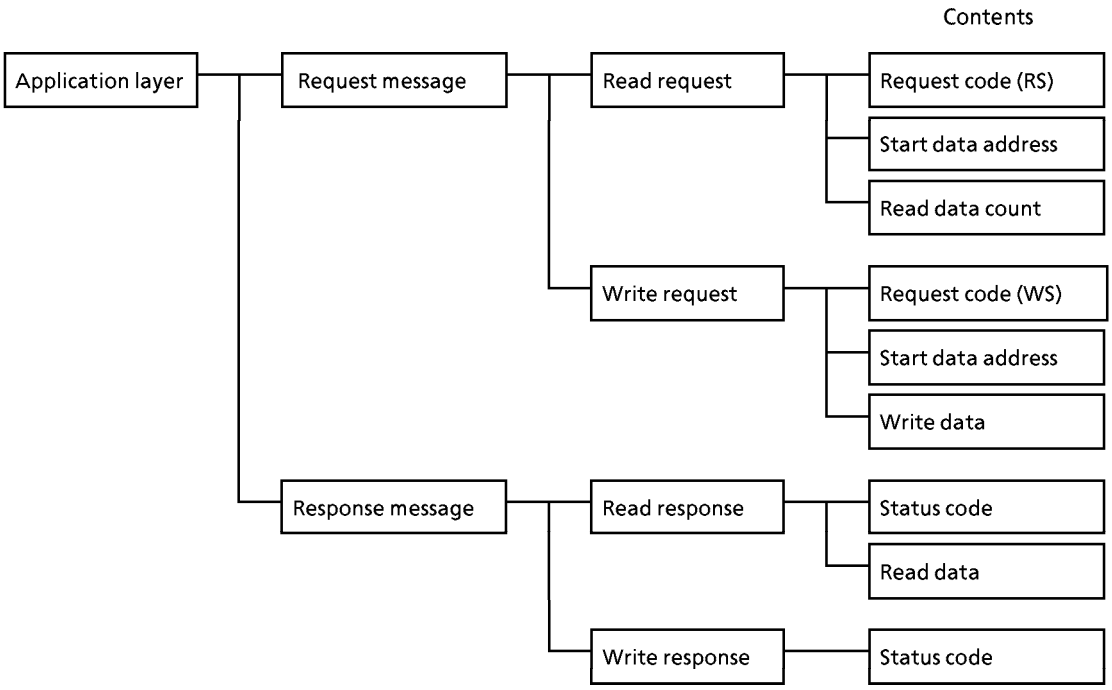
◇Caution◇

- If any of the following errors has occurred in the contents of the data link layer, the instrument does not respond to them:
  - The communication conditions for both stations do not meet each other (such as different transmission speeds, or parity error occurrence).
  - The transmitted station address differs from the station address of the object instrument.
  - The station address is "00".
  - STX, ETX, CR and LF are not placed at the specified positions.
  - The device distinction code is neither "X" nor "x".
  - The station address, sub-address, or check-sum is not two characters long.
  - The calculation result of the check-sum does not meet the check-sum of the message.
  - Non-designated characters are included in the message.
- As for the contents of the data link layer, the same message as the request message of an instrument is set as a response message, except for the check-sum.
- Use the upper-case characters "A" to "F" in the hexadecimal numeric part to be used for the station address and check-sum.

4 - 3 Application layer

■ Outline of application layer

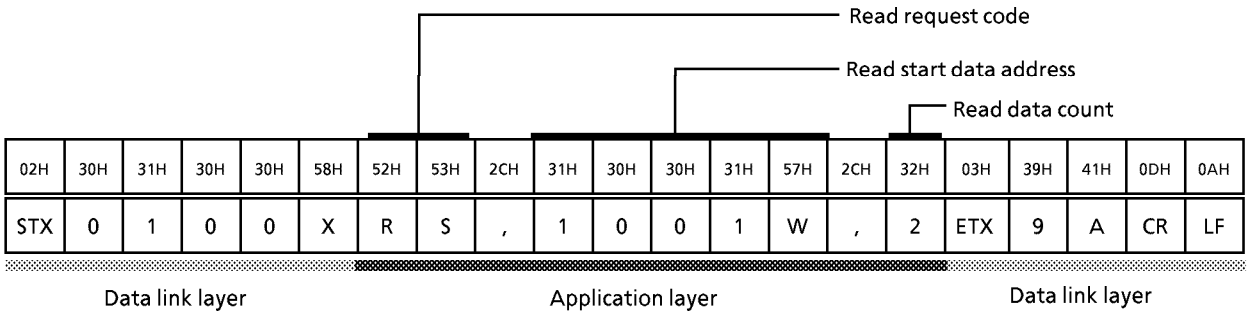
- The application layer includes a request, data, data count, and message decision information (status code).
- The application layers of the request message and response message differ in structure from each other.
- There are two types of request messages; "a read request" and "a write request".
  The response message includes a response corresponding to each request.
- It can be identified by a status code how the request message has been processed.



4 - 4 Data read

■ Description of read request

- This request permits the contents of continuous data addresses starting with the read start data address designated to be read in one message.
- The application layer of a read request consists of the following three types of data:



- Individual data are partitioned by a comma "," (character code 2CH), respectively.
- An upper-case character code is used for each numeric or character in the application layer.
- Decimal number is used for each numeric.
- Unnecessary "0" or a space cannot be added to each data.
  - ☐Example : The underlined part of "RS, 01001W, 2" is wrong.
  - ☐Example : The underlined parts of "RS, 1001W, 02" are wrong.
  - ☐Example : The above figure indicates an example that two-data information is read from 1001W in one message.

● Read request code (RS)

◆Role : A command which indicates read.

◇Description : Two characters "RS" (52H, 53H).

● Read start data address

◆Role : Designates the start data address from which data is to be read.

◇Description : The correspondence between data address and read data is shown in the "Communication data table"

· Be sure to add "W" (57H) immediately after the numeric of the data address.

● Read data count

◆Role : It is designated how many data are read continuously, starting with the designated data address.

◇Caution◇

- For the high limit of the read data count, see the "Communication data table".

■ Read response

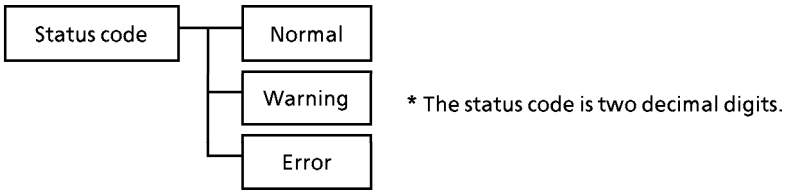
◆Role : When the message in the data link layer is proper, a response message is sent back according to the contents of the request message.

◇Description : All the data in the application layer are expressed in decimal character codes.

● Status code

◆Role : A numeric by which it can be identified how the request message has been processed on the instrument side. Different value is set according to the result of processing.

◇Description : The response message includes a "status code" without fail. The status codes are classified as follows;



● Normal response/warning response

◆Role : Sends back the read data.

◇Description : Information in the application layer

· Status code : For the details of the status code, see the "Status code table".

· Read data : Data are put in by the designated count.

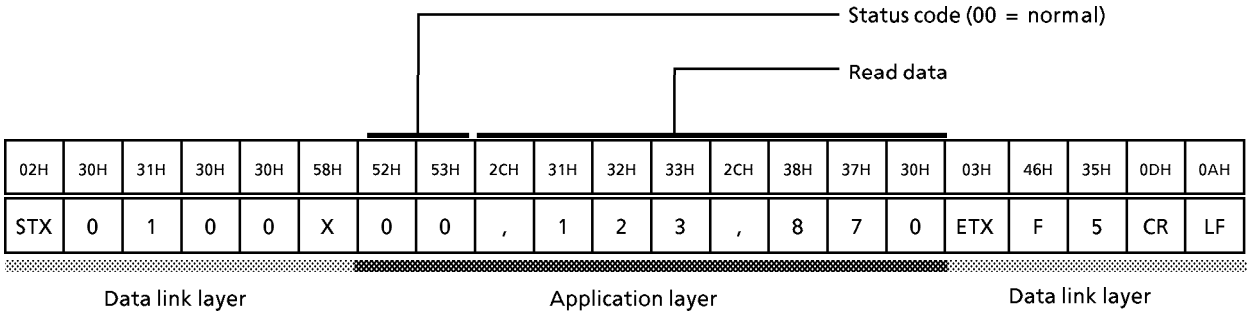
: The decimal point is removed from a numeric to be put in.

□Example : "55.6" is converted into "556" when it is put in.

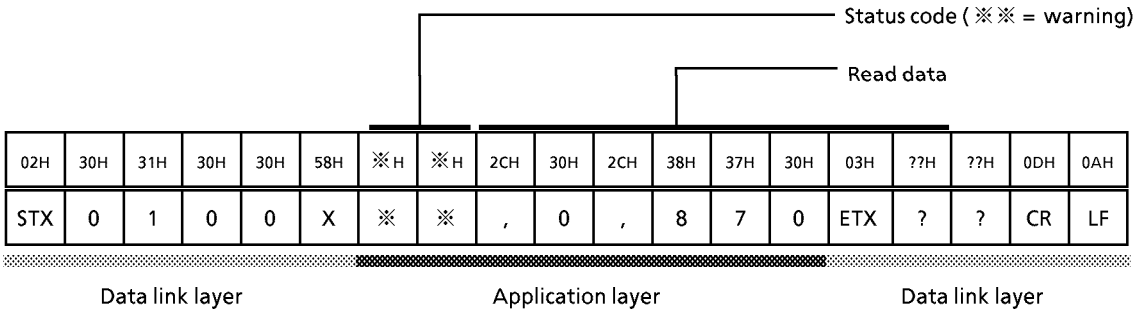
: Individual data are partitioned with a comma (2CH), respectively.

: The range and number of digits of each data depend upon the read data.

□Example : In case of normal response (when there are two read data, and all the data are read properly)



□Example : In case of warning response (numeric corresponding to the warning code is put in ※※ .)



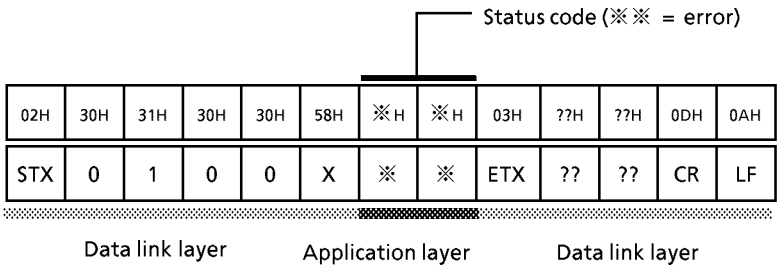
● Error response

◆Role : Indicates that there is an error in the request message, and it cannot be normally read. Therefore, there is no data herein.

◇Description : Information in the application layer.

· Status code : Indicates an error type.
For details, see the "Status code table".

□Example : In case of error response:



■ Expression of decimal numeric (numeric data)

◆Role : All the numeric part, read count, write value (described in WS command), and read data at the data address follow the rules given below.

(1) When a numeric is negative, add a minus sign "-" (2DH) before the numeric.

□Example : "-123" (2DH, 31H, 32H, 33H)

(2) When a numeric is 0, use one 0.

□Example : "0" (30H)

□Example : "00" (30H, 30H) is wrong.

(3) When a numeric is positive, never add a plus sign "+" before the numeric.

□Example : "+123" (2BH, 31H, 32H, 33H) is wrong.

(4) Never add unnecessary 0 or a space before a numeric.

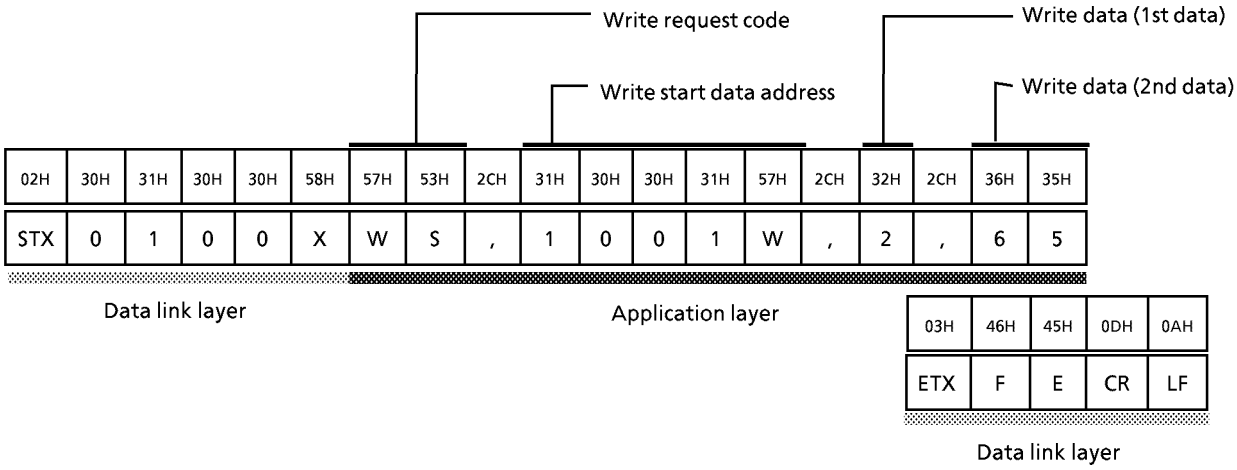
□Example: "0123" (30H, 31H, 32H, 33H) is wrong,

□Example : " 123" (20H, 31H, 32H, 33H)

4 - 5 Data write

■ Description of write request

- This request permits the contents of continuous data addresses, starting with the designated write start data address to be simultaneously written in one message.
- The application layer of a write request consists of the following three types of data:



- Individual data are partitioned with a comma "," (character code 2CH), respectively.
- The write data count need not be designated.
- An upper case character code is used for each numeric or character in the application layer.
- Decimal number is used for each numeric.
- Unnecessary "0" (30H) or a space cannot be added to each data.
  - ☐Example : The underlined part of "WS, 01001W, 2" is wrong.
  - ☐Example : The underlined parts of "WS, 1001W, 02" are wrong.
  - ☐Example : The above figure shows an example that 2 and 65 are written at addresses 1001W and 1002W, respectively, in one message.

● Write request code (WS)

◆Role : A command which indicates write.
◇Description : Two characters "WS" (57H, 53H)

● Write start data address

◆Role : Designates the start data address for write.
· For the correspondence between the data address and write data, see the "Communication data table".
· Be sure to add "W" (57H) after the numeric representing the data address.

● Write data

◆Role : Data to be written at continuous addresses starting with the designated data address.

◇Description: The range of a numeric to be written differs, depending upon each data address.

· Individual data are partitioned with a comma (2CH), respectively.

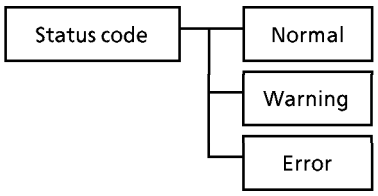
· The data address at which the corresponding data is written is incremented by 1 sequentially, starting with the start data address (see the example given on the preceding page).

· The number of data which can be written in one message is limited. For details, see the "Communication data table".

■ Write response

◆Role : When the message in the data link layer is proper, the status code only is sent back.

◇Description: The status codes are classified as follows:



* The status code is expressed in two decimal digits.

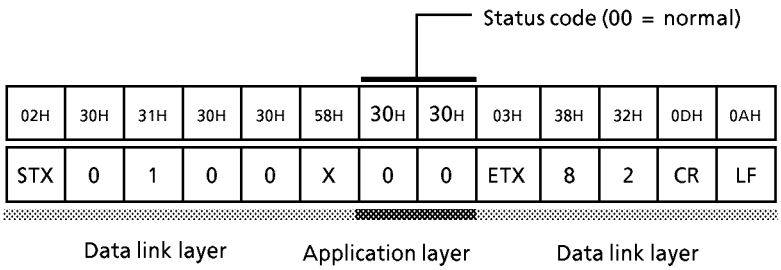
● Normal response/warning response

◆Role : Information concerning the result of processing the write request message is sent back.
Only the normal status code or warning status code is sent back.

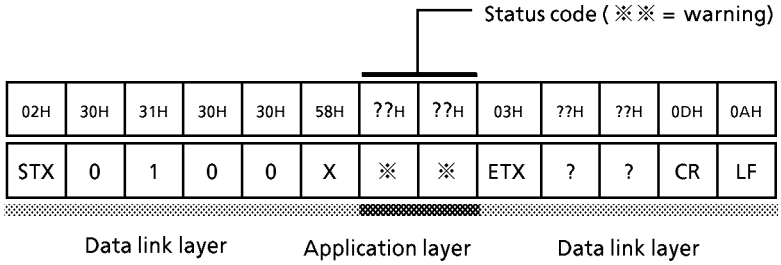
◇Description: Information in the application layer

· Status code: A numeric by which it can be identified how the request message has been processed on the instrument side.

□Example: An example of normal response (when all data are properly written)



☐Example : In case of warning response (numeric corresponding to the warning code is put in ※※.)



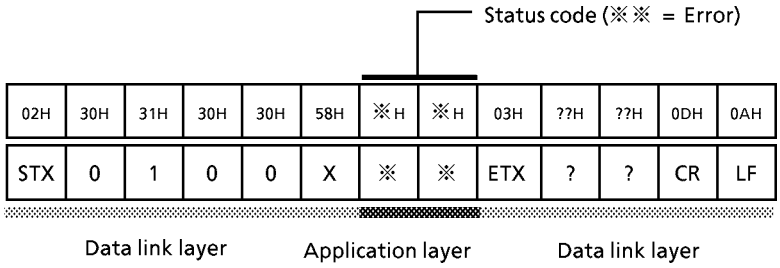
● Error response

◆Role : Only the error status code is sent back.

◇Description : Information in the application layer

· Status code : Indicates that there is an error in the request message, and write processing cannot be done.
For details, see the "Status code table".

☐Example : In case of error response (numeric corresponding to the error code is put in ※※).



4 - 6 Status code table

■ Normal and warning ends

Status code	Type	Contents and action	Read data provided or not
00	Normal	Normal end	Depends upon command.
21	Warning	The status of instrument could not be changed (status relation write). *1 (ex.:RUN⇔READY,AUTO⇔MANUAL,REMOTE⇔LOCAL, etc.)	None
23	Warning	Read is stopped due to access to an address out of the range.	Provided
24	Warning	Auto tuning could not be executed. (Processing is continued at other than the relevant word address due to occurrence of alarm, etc.) *2	None
25	Warning	A protected word address in RAM was accessed for read. Read is continued with data "0" padded in the relevant word address.	Provided
26	Warning	A protected word address in EEPROM was accessed for read. Read is continued with data "0" padded in the relevant word address.	Provided
27	Warning	Write was attempted at a protected word address in RAM. Write is continued without writing data at the relevant word address. An SP group cannot be changed (because RSW is set to LSP selection). Processing is continued except for the relevant word address.	None
28	Warning	Write was attempted at a protected word address in EEPROM. Write is continued without writing data at the relevant word address. An SP group cannot be changed (because RSW is set to LSP selection). Processing is continued except for the relevant word address.	None
10	Error	A parameter error. All messages have been cancelled.	None
40	Error	"W" has not been set at a word address. All messages have been cancelled.	None
41	Error	The instrument is not put in a write ready status. (ex.:A SETUP item is attempted to be written during RUN.)	None
42	Error	The write word count is not normal. All messages have been cancelled.	None
44	Error	"," is not set immediately after a command. All messages have been cancelled.	None
46	Error	A word address is not normal. All messages have been cancelled.	None
47	Error	The read word count is not normal. All messages have been cancelled.	None
48	Error	A written numeric is not normal. Write has been executed at other than an abnormal word address. *3	None
99	Error	An undefined command, or other message error.	None

*1: If the READY status can not be changed over to the RUN status or vice versa by PARA item (RUN/READY changeover) write, the status code 27 or 28 is returned.

*2: At start is rejected an alarm status or READY status, and start request then causes an error response.

*3: If either one causes an error, for example, in case of OL and OH, which correspond to the low limit and high limit, respectively, both data are cancelled.

4 - 7 Timing specifications

■ Timing specifications for request message and response message

When a slave station is connected with the master station directly, the following precautions should be observed concerning the transmit timings of an request message from the master station and a response message from the slave station:

● Response monitor time

The maximum response time required from the end of transmitting an request message from the master station to the start of receiving a response message from the slave station is 2sec (section (1)). Therefore, the response monitor time should be set to 2sec.

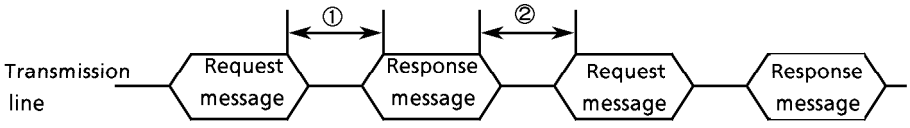
Generally, when the response monitor time reaches time up, the request message is retransmitted.

For details, see the "Communication program for master station".

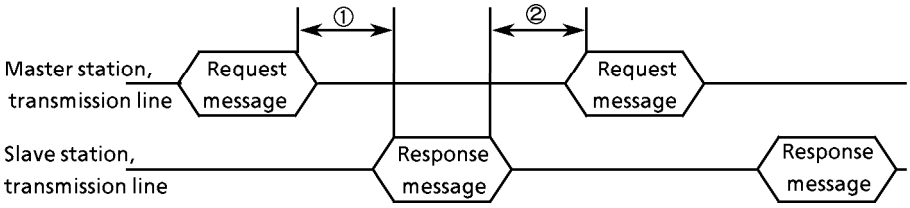
● Transmit start time

A wait time of 10ms or more is required before the master station starts to transmit the next request message (to the same slave station or a different slave station) after the end of receiving a response message (section (2)).

- RS-485 3-wires system



- RS-485 5-wires system and RS-232C

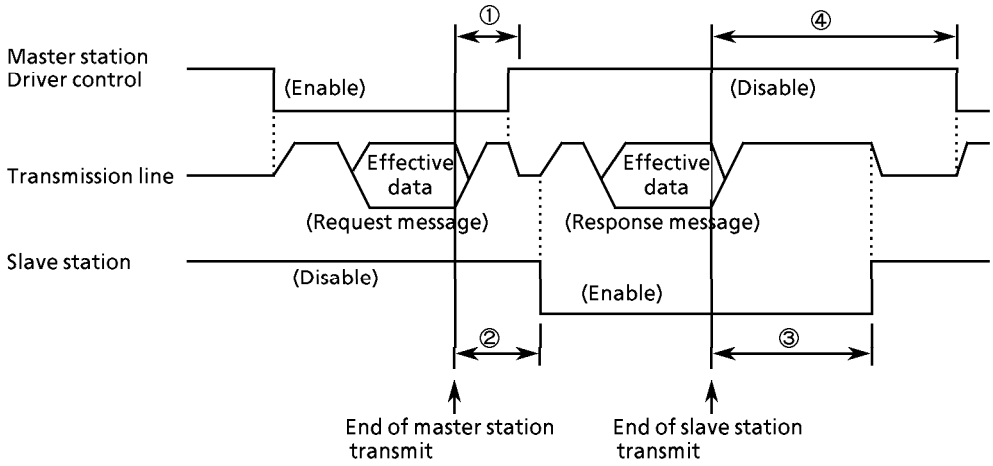


① End of master station transmit - Request interval time of slave station = 2000ms max.

② End of slave station transmit - Request interval time of master station = 10ms min.

■ RS-485 driver control timing specification

When the transmit/receive of the RS-485 3-wires system is directly controlled by the master station, utmost care should be exercised about the following timing:



① Transmit end of master station - Driver disable time = 500μs max.
② Receive end of slave station - Driver enable time = 1ms min.
③ Transmit end of slave station - Driver disable time = 10ms max.
④ Receive end of master station - Driver enable time = 10ms min.

5.Communication data table

5 - 1 Preliminary knowledge of communication data handling

■ Types and formats of communication data

● Types of communication data

The communication data are classified into the following types:

- Run status : Data indicating the run status of instrument. (PV, alarm, etc.)
- SETUP : Data for setting the status of instrument before running (setting of input range, etc.).
- Parameter : Data to be changed/operated during running. (PID constants, etc.)

These data are communication every data type.

● Format of communication data

The communication data are classified into the following formats:

- Numeric data : Data indicating numerics (PV, SP, etc.)
- Bit data : Data, each bit of which is given meaning (alarm, etc.). The bit data must be composed during transmit, and be decomposed during receive.

■ Communication data storing memory

● Memory types

The communication data are stored in the memory (storage device) of the instrument. There are the following two types of memory used by this instrument:

- RAM : The stored data are cleared if the power supply is turned off. However data can be written anytime in this memory.
- EEPROM : The stored data are kept stored even when the power supply is turned off, but the data write count is limited due to the characteristics of the storage device. The maximum write count is 100,000 times.

● Communication object memory

In communication, data should be read/written from/to the above-mentioned two types of memory selectively according to the purpose and use. There is the following difference between the object memories:

- RAM : Data is read/written from/to RAM only. When the power supply is turned off after data is written in RAM, and then it is turned on again, the data in EEPROM are copied on RAM, and the data in RAM become the same as in EEPROM.
- EEPROM : Data are written in both RAM and EEPROM. However, data can be read from RAM only, but cannot be read directly from EEPROM.

PRECAUTION

The data write count in EEPROM is limited to 100,000 times. When it is necessary to write SP or other data frequently and repeatedly in communication, RAM should be selected as an object memory.

■ Data address

The data addresses are allocated as shown in the table below.

(SDC40A)

Item	RAM		EEPROM	
	Offset value	Address	Offset value	Address
Run status (PV, etc.)	500	501 to 544	3500	3501 to 3544
SP relation	1000	1001 to 1019	4000	4001 to 4019
EV relation	1500	1501 to 1519	4500	4501 to 4519
PID relation	2000	2001 to 2080	5000	5001 to 5080
PARA relation	2500	2501 to 2580	5500	5501 to 5580
SETUP relation	3000	3001 to 3100	6000	6001 to 6100

(SDC40G)

Item	RAM		EEPROM	
	Offset value	Address	Offset value	Address
Run status (PV, etc.)	500	501 to 544	3500	3501 to 3544
SP relation	1000	1001 to 1014	4000	4001 to 4014
EV relation	1500	1501 to 1519	4500	4501 to 4519
PID relation	2000	2001 to 2040	5000	5001 to 5040
PARA relation	2500	2501 to 2580	5500	5501 to 5580
PARA2 relation	2600	2601 to 2628	5600	5601 to 5628
SETUP relation	3000	3001 to 3100	6000	6001 to 6100

■ Data read/write count

The data count which can be continuously read/written by once communication is predetermined as shown in the table below.

	RAM	EEPROM
Read	1 to 16	1 to 10
Write	1 to 16	1 to 5

Among the continuous data, any data which do not exist due to difference in model number are handled as shown below.

■ Data unit and decimal point position

A decimal point is not added to read/write data.

The unit or decimal point position is predetermined every data.

For the unit and decimal point position of each data, see the instruction manual for the main unit of instrument.

[Example]

When data to be read/written is numeric value 105, its unit or decimal point position is automatically determined by the data address, the SETUP item of the instrument and the others. Therefore, the numeric data 105 is expressed as 10.5%, 105°C, or the like according to the data address of data to be read/written.

■ Notes

- Cautions on instrument console display
  When data in written by communication with respect to a parameter indicated in the input ready status of the instrument, the display is not changed into the value set by communication, but the preceding value is kept as it is. This is because the display data to LED is not updated irrespective of change in the internal data. When the currently indicated parameter is transferred once to another parameter, and it is recalled, the value changed by communication is indicated correctly.
  When the instrument is placed in the basic display status (SP/PV/MV display status), the display is always updated according to the internal data. Therefore, even when an SP is rewritten by communication, the changed value is indicated immediately.

- Priority in data setting
  As for priority in communication, the last input value is effective as in the key input. However, when the SP selection by the remote switch is set, the remote switch input has priority. When write is then executed by communication, the status code "27" or "28" is returned.

- Keylock
  Even when the instrument is set to the keylock status, data can be written by communication.

- Restrictions on read
  Any parameters which cannot be called by key operation on the instrument can be all called by communication.
  If an address out of the range (non-designated address) is accessed, the status code "23" is returned.

- Restrictions on write
  Any parameters which cannot be input by key operation on the instrument can be written by communication. The restrictions on write (the high and low limits, etc.) are the same as in the usual input by a console.
  Even a parameter which can be input by key operation may not be able to be set by communication under an inappropriate condition.

- In case more than one data including error data are to be written in once message.
  For example, assume that the proportional band, integral time, and derivative time are written like WS, 5001W, 300, 8000, 20. Since I then exceeds the effective range, the response "48" (error response) is returned.
  At this time, beware of the following points.
  ① Data is written until a set disable data appears.
  ② No data is written at a word address where a set disable data exists, but the next data is processed.
  In the case of this example, therefore, 300 and 20 are written normally, but 8000 is not written, and the value before the message is received remains.

- Status write
  The status write command makes the LSB side of bit information effective.
  For example, when WS, 504W, 3 (both READY and RUN are designated) is written, this is interpreted as a READY command, and RUN is ignored.
  In continuous write, the following contents are ignored.

- SP setting
  The writable range of an SP item changes, depending upon the set value of C16.

C16	LSP group No.	LSP1~7	RSP	PIDno1~8
0,1	×	○	×	○
2	○	○	×	○
3	○	×	×	×

- Restriction on handy loader communication
  If all data are transferred or SETUP data is transferred by the handy loader, the SDC40 main unit is reset, and the CPL communication is interrupted.

5 - 2 SDC40A Communication data table

The address and read/write (R/W) enable status of each data are determined as shown in the table below.

RAM : Data address corresponding to RAM
EEPROM:Data address corresponding to EEPROM
R : READ
W : WRITE
○ : Enable
× : Disable
△ : A data address can be designated, but the data not in EEPROM, but in RAM is read.
▲ : A data address can be designated, but not the data in EEPROM, but the fixed data by ROM or H/W is read.
□ : An unused area. No data is obtained by read.

● Run status (PV, etc.) addresses

No	Item	Contents	RAM			EEPROM		
			Address	R	W	Address	R	W
1	Alarm status 1		501	○	×	3501	△	×
2	Alarm status 2		502	○	×	3502	△	×
3	Event status 1 to 8		503	○	×	3503	△	×
4	Status 1/run operation		504	○	○	3504	△	○
5	Status 2		505	○	×	3505	△	×
6	PV(PV1)		506	○	×	3506	△	×
7	Current SP group		507	○	×	3507	△	×
8	Current PID group		508	○	×	3508	△	×
9	SP(SP1)		509	○	×	3509	△	×
10	MV(MV1)	When manual mode, MV1(standard and RSP model) or MV2(internal cascade model) can be written by this item.	510	○	○	3510	△	○
11	Deviation (PV-SP)		511	○	×	3511	△	×
12	RSP		512	○	×	3512	△	×
13	Heat MV		513	○	×	3513	△	×
14	Cool MV		514	○	×	3514	△	×
15	RSW input status		515	○	×	3515	△	×
16	RSW function acceptance status		516	○	×	3516	△	×
17	Motor feedback value		517	○	×	3517	△	×
18	PV2		518	○	×	3518	△	×
19	Current SP group 2		519	○	×	3519	△	×
20	Current PID group 2		520	○	×	3520	△	×
21	SP2		521	○	×	3521	△	×
22	MV2		522	○	×	3522	△	×
23	Deviation (PV2-SP2)		523	○	×	3523	△	×
24	Internal RSP		524	○	×	3524	△	×
25	Reserve		525	□	×	3525	□	×

No.	Item	Contents			RAM			EEPROM		
		RSW function	Action No.	Status	Address	R	W	Address	R	W
26	RSW function 0 action No.	Non operation	0	NOP	526	○	×	3526	△	×
27	RSW function 1 action No.	RUN/READY changeover	0 1 2	Non setting RUN READY	527	○	×	3527	△	×
28	RSW function 2 action No.	AUTO/MAN changeover	0 1 2	Non setting AUTO MAN	528	○	×	3528	△	×
29	RSW function 3 action No.	REM/LOC changeover	0 1 2	Non setting LOCAL REMOTE	529	○	×	3529	△	×
30	RSW function 4 action No.	Auto tuning	0 1 2	Non setting AT stop AT start	530	○	×	3530	△	×
31	RSW function 5 action No.	Direct/reverse changeover	0 1 2	Non setting SETUP setting action SETUP opposition action	531	○	×	3531	△	×
32	RSW function 6 action No.	LSP selection	0 to 7	Selection from LSP 0 to 7	532	○	×	3532	△	×
33	RSW function 7 action No.	PID selection	0 to 7	Selection from PID 0 to 7	533	○	×	3533	△	×
34	RSW function 8 action No.	Fixed MV selection	0 1 2 3	AUTO Fixed MV 1 Fixed MV 2 Fixed MV 3	534	○	×	3534	△	×
35	RSW function 9 action No.	SP shift selection	0 to 6144	SP shift quantity selection	535	○	×	3535	△	×
36	RSW function 10 action No.	RSP ratio selection	0 to 7	RSP ratio selection	536	○	×	3536	△	×
37	RSW function 11 action No.	Computer backup selection	0 1 2 3 4	Non setting System 1 backup (local) System 1 remote System 2 backup (local) System 2 remote	537	○	×	3537	△	×
38	RSW function 12 action No.	Slave LSP selection	0 1 2	Non setting Slave LSP6 Slave LSP7	538	○	×	3538	△	×
39	Reserve				539	□	×	3539	□	×
40	Reserve				540	□	×	3540	□	×
41	Reserve				541	□	×	3541	□	×
42	Reserve				542	□	×	3542	□	×
43	Extension 1				543	○	×	3543	△	×
44	Extension 2				544	○	×	3544	△	×

● SP relation addresses

No	Display (The 3rd line indicates FUNC.)	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	S P n o □□□□ □	LSP group No. (indicated on the FUNC indicator.)	1001	○	○	4001	△	○
2	S P □□□□ 0	LSP0 value	1002	○	○	4002	△	○
3	S P □□□□ 1	LSP1 value	1003	○	○	4003	△	○
4	S P n o □□□□ 2	LSP2 value	1004	○	○	4004	△	○
5	S P n o □□□□ 3	LSP3 value	1005	○	○	4005	△	○
6	S P □□□□ 4	LSP4 value	1006	○	○	4006	△	○
7	S P □□□□ 5	LSP5 value	1007	○	○	4007	△	○
8	S P □□□□ 6	LSP6 value	1008	○	○	4008	△	○
9	S P □□□□ 7	LSP7 value	1009	○	○	4009	△	○
10	r S P □□□□ 8	RSP value	1010	○	×	4010	△	×
	H o S t □□□□ 8	Host MV value (when the computer backup function is used)						
	r S P □□□□ 8	Internal RSP value (internal cascade model)						
11	P I d n o □ 0	PID group designation (when LSP0 is used)	1011	○	○	4011	△	○
12	P I d n o □ 1	PID group designation (when LSP1 is used)	1012	○	○	4012	△	○
13	P I d n o □ 2	PID group designation (when LSP2 is used)	1013	○	○	4013	△	○

No	Display (The 3rd line indicates FUNC.)	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
14	P I d n o □ 3	PID group designation (when LSP3 is used)	1014	○	○	4014	△	○
15	P I d n o □ 4	PID group designation (when LSP4 is used)	1015	○	○	4015	△	○
16	P I d n o □ 5	PID group designation (when LSP5 is used)	1016	○	○	4016	△	○
17	P I d n o □ 6	PID group designation (when LSP6 is used)	1017	○	○	4017	△	○
18	P I d n o □ 7	PID group designation (when LSP7 is used)	1018	○	○	4018	△	○
19	P I d n o □ 8	PID group designation (when RSP is used) (when host MV is used) (when internal RSP is used)	1019	○	○	4019	△	○

● EV relation addresses

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	E1	Event 1 set value	1501	○	○	4501	△	○
2	E2	Event 2 set value	1502	○	○	4502	△	○
3	E3	Event 3 set value	1503	○	○	4503	△	○
4	E4	Event 4 set value	1504	○	○	4504	△	○
5	E5	Event 5 set value	1505	○	○	4505	△	○
6	E6	Event 6 set value	1506	○	○	4506	△	○
7	E7	Event 7 set value	1507	○	○	4507	△	○
8	E8	Event 8 set value	1508	○	○	4508	△	○
9	HYS1	Event 1 hysteresis	1509	○	○	4509	△	○
10	HYS2	Event 2 hysteresis	1510	○	○	4510	△	○
11	HYS3	Event 3 hysteresis	1511	○	○	4511	△	○
12	HYS4	Event 4 hysteresis	1512	○	○	4512	△	○
13	HYS5	Event 5 hysteresis	1513	○	○	4513	△	○
14	HYS6	Event 6 hysteresis	1514	○	○	4514	△	○
15	HYS7	Event 7 hysteresis	1515	○	○	4515	△	○
16	HYS8	Event 8 hysteresis	1516	○	○	4516	△	○
17	dL1	Event 1 on delay time	1517	○	○	4517	△	○
18	dL2	Event 2 on delay time	1518	○	○	4518	△	○
19	dL3	Event 3 on delay time	1519	○	○	4519	△	○

● PID relation addresses

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	P-0	Proportional band 0	2001	○	○	5001	△	○
2	I-0	Integral time 0	2002	○	○	5002	△	○
3	d-0	Derivative time 0	2003	○	○	5003	△	○
4	oL-0	Manipulated variable low limit 0	2004	○	○	5004	△	○
5	oH-0	Manipulated variable high limit 0	2005	○	○	5005	△	○
6	rE-0	Manual reset 0	2006	○	○	5006	△	○
7	br-0	Brake 0	2007	○	○	5007	△	○
8	dP-0	Disturbance control proportional band 0	2008	○	○	5008	△	○
9	dI-0	Disturbance control integral time 0	2009	○	○	5009	△	○
10	dd-0	Disturbance control derivative time 0	2010	○	○	5010	△	○
11	P-1	Proportional band 1	2011	○	○	5011	△	○
12	I-1	Integral time 1	2012	○	○	5012	△	○
13	d-1	Derivative time 1	2013	○	○	5013	△	○
14	oL-1	Manipulated variable low limit 1	2014	○	○	5014	△	○
15	oH-1	Manipulated variable high limit 1	2015	○	○	5015	△	○
16	rE-1	Manual reset 1	2016	○	○	5016	△	○
17	br-1	Brake 1	2017	○	○	5017	△	○
18	dP-1	Disturbance control proportional band 1	2018	○	○	5018	△	○
19	dI-1	Disturbance control integral time 1	2019	○	○	5019	△	○
20	dd-1	Disturbance control derivative time 1	2020	○	○	5020	△	○
21	P-2	Proportional band 2	2021	○	○	5021	△	○
22	I-2	Integral time 2	2022	○	○	5022	△	○
23	d-2	Derivative time 2	2023	○	○	5023	△	○
24	oL-2	Manipulated variable low limit 2	2024	○	○	5024	△	○
25	oH-2	Manipulated variable high limit 2	2025	○	○	5025	△	○
26	rE-2	Manual reset 2	2026	○	○	5026	△	○
27	br-2	Brake 2	2027	○	○	5027	△	○
28	dP-2	Disturbance control proportional band 2	2028	○	○	5028	△	○
29	dI-2	Disturbance control integral time 2	2029	○	○	5029	△	○
30	dd-2	Disturbance control derivative time 2	2030	○	○	5030	△	○
31	P-3	Proportional band 3	2031	○	○	5031	△	○
32	I-3	Integral time 3	2032	○	○	5032	△	○
33	d-3	Derivative time 3	2033	○	○	5033	△	○
34	oL-3	Manipulated variable low limit 3	2034	○	○	5034	△	○
35	oH-3	Manipulated variable high limit 3	2035	○	○	5035	△	○
36	rE-3	Manual reset 3	2036	○	○	5036	△	○
37	br-3	Brake 3	2037	○	○	5037	△	○
38	dP-3	Disturbance control proportional band 3	2038	○	○	5038	△	○
39	dI-3	Disturbance control integral time 3	2039	○	○	5039	△	○
40	dd-3	Disturbance control derivative time 3	2040	○	○	5040	△	○

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
41	P-4	Proportional band 4	2041	○	○	5041	△	○
42	I-4	Integral time 4	2042	○	○	5042	△	○
43	d-4	Derivative time 4	2043	○	○	5043	△	○
44	oL-4	Manipulated variable low limit 4	2044	○	○	5044	△	○
45	oH-4	Manipulated variable high limit 4	2045	○	○	5045	△	○
46	rE-4	Manual reset 4	2046	○	○	5046	△	○
47	br-4	Brake 4	2047	○	○	5047	△	○
48	dP-4	Disturbance control proportional band 4	2048	○	○	5048	△	○
49	dI-4	Disturbance control integral time 4	2049	○	○	5049	△	○
50	dd-4	Disturbance control derivative time 4	2050	○	○	5050	△	○
51	P-5	Proportional band 5	2051	○	○	5051	△	○
52	I-5	Integral time 5	2052	○	○	5052	△	○
53	d-5	Derivative time 5	2053	○	○	5053	△	○
54	oL-5	Manipulated variable low limit 5	2054	○	○	5054	△	○
55	oH-5	Manipulated variable high limit 5	2055	○	○	5055	△	○
56	rE-5	Manual reset 5	2056	○	○	5056	△	○
57	br-5	Brake 5	2057	○	○	5057	△	○
58	dP-5	Disturbance control proportional band 5	2058	○	○	5058	△	○
59	dI-5	Disturbance control integral time 5	2059	○	○	5059	△	○
60	dd-5	Disturbance control derivative time 5	2060	○	○	5060	△	○
61	P-6	Proportional band 6	2061	○	○	5061	△	○
62	I-6	Integral time 6	2062	○	○	5062	△	○
63	d-6	Derivative time 6	2063	○	○	5063	△	○
64	oL-6	Manipulated variable low limit 6	2064	○	○	5064	△	○
65	oH-6	Manipulated variable high limit 6	2065	○	○	5065	△	○
66	rE-6	Manual reset 6	2066	○	○	5066	△	○
67	br-6	Brake 6	2067	○	○	5067	△	○
68	dP-6	Disturbance control proportional band 6	2068	○	○	5068	△	○
69	dI-6	Disturbance control integral time 6	2069	○	○	5069	△	○
70	dd-6	Disturbance control derivative time 6	2070	○	○	5070	△	○
71	P-7	Proportional band 7	2071	○	○	5071	△	○
72	I-7	Integral time 7	2072	○	○	5072	△	○
73	d-7	Derivative time 7	2073	○	○	5073	△	○
74	oL-7	Manipulated variable low limit 7	2074	○	○	5074	△	○
75	oH-7	Manipulated variable high limit 7	2075	○	○	5075	△	○
76	rE-7	Manual reset 7	2076	○	○	5076	△	○
77	br-7	Brake 7	2077	○	○	5077	△	○
78	dP-7	Disturbance control proportional band 7	2078	○	○	5078	△	○
79	dI-7	Disturbance control integral time 7	2079	○	○	5079	△	○
80	dd-7	Disturbance control derivative time 7	2080	○	○	5080	△	○

● Parameter relation addresses

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	rn.ry	RUN/READY changeover	2501	○	○	5501	△	○
2	FL	Input 1 filter	2502	○	○	5502	△	○
3	rA	Input 1 ratio	2503	○	○	5503	△	○
4	bI	Input 1 bias	2504	○	○	5504	△	○
5	FL2	Input 2 filter	2505	○	○	5505	△	○
6	rA2	Input 2 ratio	2506	○	○	5506	△	○
7	bI2	Input 2 bias	2507	○	○	5507	△	○
8	cy	Time proportional output cycle (output 1)	2508	○	○	5508	△	○
9	cy2	Time proportional output cycle (output 2)	2509	○	○	5509	△	○
10	outL	Manipulated variable change limit (master side MV1)	2510	○	○	5510	△	○
11	outr	Manipulated variable change limit (slave side MV2)	2511	○	○	5511	△	○
12	Iout	PID operation initial manipulated variable	2512	○	○	5512	△	○
13	rPId	PID operation initialize	2513	○	○	5513	△	○
14	dIFF	ON/OFF control differential position proportional dead zone Heat/cool dead zone	2514	○	○	5514	△	○
15	Et1	Event 1 type	2515	○	○	5515	△	○
16	Ed1	Event 1 stand-by	2516	○	○	5516	△	○
17	Et2	Event 2 type	2517	○	○	5517	△	○
18	Ed2	Event 2 stand-by	2518	○	○	5518	△	○
19	Et3	Event 3 type	2519	○	○	5519	△	○
20	Ed3	Event 3 stand-by	2520	○	○	5520	△	○
21	Et4	Event 4 type	2521	○	○	5521	△	○
22	Ed4	Event 4 stand-by	2522	○	○	5522	△	○
23	Et5	Event 5 type	2523	○	○	5523	△	○
24	Ed5	Event 5 stand-by	2524	○	○	5524	△	○
25	Et6	Event 6 type	2525	○	○	5525	△	○
26	Ed6	Event 6 stand-by	2526	○	○	5526	△	○
27	Et7	Event 7 type	2527	○	○	5527	△	○
28	Ed7	Event 7 stand-by	2528	○	○	5528	△	○
29	Et8	Event 8 type	2529	○	○	5529	△	○
30	Ed8	Event 8 stand-by	2530	○	○	5530	△	○
31	dLt	Event on delay time	2531	○	○	5531	△	○
32	r-tr	RSP tracking	2532	○	○	5532	△	○
33	SPU	LSP ramp up gradient (master side SP1)	2533	○	○	5533	△	○
34	SPd	LSP ramp down gradient (master side SP1)	2534	○	○	5534	△	○
35	rSPU	RSP ramp up gradient (slave side SP2)	2535	○	○	5535	△	○
36	rSPd	RSP ramp down gradient (slave side SP2)	2536	○	○	5536	△	○
37	rA-t	SP ramp unit setting (common to LSP and RSP)	2537	○	○	5537	△	○
38	g.b.-L	Low limit of green belt	2538	○	○	5538	△	○
39	g.b.-H	High limit of green belt	2539	○	○	5539	△	○
40	M-C	Motor control selection	2540	○	○	5540	△	○

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
41	M-At	Automatic adjustment of motor opening	2541	○	○	5541	△	○
42	M-CL	Motor opening adjustment for full closing	2542	○	○	5542	△	○
43	M-OP	Motor opening adjustment for full opening	2543	○	○	5543	△	○
44	M-t	Fully open/close time in motor opening adjustment	2544	○	○	5544	△	○
45	dISP	One-digit masking in display	2545	○	○	5545	△	○
46	At	Auto tuning system	2546	○	○	5546	△	○
47	St	Smart tuning system	2547	○	○	5547	△	○
48	2PId	2 freedom degree PID selection	2548	○	○	5548	△	○
49	G-r	Variable gain/RSP ratio function selection	2549	○	○	5549	△	○
50	Gn-1	Gain 1/ratio 1	2550	○	○	5550	△	○
51	Gn-2	Gain 2/ratio 2	2551	○	○	5551	△	○
52	Gn-3	Gain 3/ratio 3	2552	○	○	5552	△	○
53	Gn-4	Gain 4/ratio 4	2553	○	○	5553	△	○
54	Gn-5	Gain 5/ratio 5	2554	○	○	5554	△	○
55	Gn-6	Gain 6/ratio 1	2555	○	○	5555	△	○
56	Gn-7	Gain 1/ratio 1	2556	○	○	5556	△	○
57	Gn-8	Gain 8	2557	○	○	5557	△	○
58	Gn-9	Gain 9	2558	○	○	5558	△	○
59	t-A.1	Input broken line approximation A1	2559	○	○	5559	△	○
60	t-A.2	Input broken line approximation A2	2560	○	○	5560	△	○
61	t-A.3	Input broken line approximation A3	2561	○	○	5561	△	○
62	t-A.4	Input broken line approximation A4	2562	○	○	5562	△	○
63	t-A.5	Input broken line approximation A5	2563	○	○	5563	△	○
64	t-A.6	Input broken line approximation A6	2564	○	○	5564	△	○
65	t-A.7	Input broken line approximation A7	2565	○	○	5565	△	○
66	t-A.8	Input broken line approximation A8	2566	○	○	5566	△	○
67	t-A.9	Input broken line approximation A9	2567	○	○	5567	△	○
68	t-A.A	Input broken line approximation A10	2568	○	○	5568	△	○
69	t-A.b	Input broken line approximation A11	2569	○	○	5569	△	○
70	t-b.1	Input broken line approximation B1	2570	○	○	5570	△	○
71	t-b.2	Input broken line approximation B2	2571	○	○	5571	△	○
72	t-b.3	Input broken line approximation B3	2572	○	○	5572	△	○
73	t-b.4	Input broken line approximation B4	2573	○	○	5573	△	○
74	t-b.5	Input broken line approximation B5	2574	○	○	5574	△	○
75	t-b.6	Input broken line approximation B6	2575	○	○	5575	△	○
76	t-b.7	Input broken line approximation B7	2576	○	○	5576	△	○
77	t-b.8	Input broken line approximation B8	2577	○	○	5577	△	○
78	t-b.9	Input broken line approximation B9	2578	○	○	5578	△	○
79	t-b.A	Input broken line approximation B10	2579	○	○	5579	△	○
80	t-b.b	Input broken line approximation B11	2580	○	○	5580	△	○

● SETUP relation addresses

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	C1	Keylock	3001	○	○	6001	△	○
2	C2	Control action (master)	3002	○	○	6002	△	○
3	C3	Control action (slave)	3003	○	○	6003	△	○
4	C4	Heat/cool output allocation	3004	○	○	6004	△	○
5	C5	Input 1 temperature unit	3005	○	○	6005	△	○
6	C6	Input type 1 range type	3006	○	○	6006	△	○
7	C7	Input 1 linear decimal point position	3007	○	○	6007	△	○
8	C8	Input 1 0% setting	3008	○	○	6008	△	○
9	C9	Input 1 100% setting	3009	○	○	6009	△	○
10	C10	Input 1 square root extraction operation dropout	3010	○	○	6010	△	○
11	C11	Input 2 range type	3011	○	○	6011	△	○
12	C12	Input 2 linear decimal point position	3012	○	○	6012	△	○
13	C13	Input 2 0% setting (0% = 4mA/1V)	3013	○	○	6013	△	○
14	C14	Input 2 100% setting (100% = 20mA/5V)	3014	○	○	6014	△	○
15	C15	Input 2 square root extraction operation dropout	3015	○	○	6015	△	○
16	C16	LSP setting system	3016	○	○	6016	△	○
17	C17	Low limit of SP limit	3017	○	○	6017	△	○
18	C18	High limit of SP limit	3018	○	○	6018	△	○
19	C19	Manipulated variable setting in PV overrange	3019	○	○	6019	△	○
20	C20	Manipulated variable in PV overrange	3020	○	○	6020	△	○
21	C21	Manual change mode	3021	○	○	6021	△	○
22	C22	Preset manual manipulated variable	3022	○	○	6022	△	○
23	C23	Manipulated variable of RSW fixed MV1	3023	○	○	6023	△	○
24	C24	Manipulated variable of RSW fixed MV2	3024	○	○	6024	△	○
25	C25	Manipulated variable of RSW fixed MV3	3025	○	○	6025	△	○
26	C26	READY manipulated variable (READY time heat side manipulated variable)	3026	○	○	6026	△	○
27	C27	READY cool side manipulated variable	3027	○	○	6027	△	○
28	C28	READY event	3028	○	○	6028	△	○
29	C29	Internal RSP 0% setting	3029	○	○	6029	△	○
30	C30	Internal RSP 100% setting	3030	○	○	6030	△	○
31	C31	Input 1/input 2 exchange	3031	○	○	6031	△	○
32	C32	Auxiliary output 1 type	3032	○	○	6032	△	○
33	C33	Auxiliary output 1 4mA setting	3033	○	○	6033	△	○
34	C34	Auxiliary output 1 20mA setting	3034	○	○	6034	△	○
35	C35	Auxiliary output 1 READY output	3035	○	○	6035	△	○
36	C36	Auxiliary output 1 preset READY output value	3036	○	○	6036	△	○
37	C37	Auxiliary output 2 type	3037	○	○	6037	△	○
38	C38	Auxiliary output 2 4mA setting	3038	○	○	6038	△	○
39	C39	Auxiliary output 2 20mA setting	3039	○	○	6039	△	○
40	C40	Auxiliary output 2 READY output	3040	○	○	6040	△	○

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
41	C41	Auxiliary output 2 preset READY output value	3041	○	○	6041	△	○
42	C42	RSW1 allocation	3042	○	○	6042	△	○
43	C43	RSW2 allocation	3043	○	○	6043	△	○
44	C44	RSW3 allocation	3044	○	○	6044	△	○
45	C45	RSW4 allocation	3045	○	○	6045	△	○
46	C46	RSW5 allocation	3046	○	○	6046	△	○
47	C47	RSW6 allocation	3047	○	○	6047	△	○
48	C48	RSW7 allocation	3048	○	○	6048	△	○
49	C49	RSW8 allocation	3049	○	○	6049	△	○
50	C50	RSW9 allocation	3050	○	○	6050	△	○
51	C51	RSW10 allocation	3051	○	○	6051	△	○
52	C52	RSW11 allocation	3052	○	○	6052	△	○
53	C53	RSW12 allocation	3053	○	○	6053	△	○
54	C54	RSW LSP shift width	3054	○	○	6054	△	○
55	C55	UF1 key allocation	3055	○	○	6055	△	○
56	C56	UF1 allocation detail 1	3056	○	○	6056	△	○
57	C57	UF1 allocation detail 2	3057	○	○	6057	△	○
58	C58	UF1 allocation detail 3	3058	○	○	6058	△	○
59	C59	UF1 allocation detail 4	3059	○	○	6059	△	○
60	C60	UF2 key allocation	3060	○	○	6060	△	○
61	C61	UF2 allocation detail 1	3061	○	○	6061	△	○
62	C62	UF2 allocation detail 2	3062	○	○	6062	△	○
63	C63	UF2 allocation detail 3	3063	○	○	6063	△	○
64	C64	UF2 allocation detail 4	3064	○	○	6064	△	○
65	C65	UF2 allocation detail 5	3065	○	○	6065	△	○
66	C66	UF2 allocation detail 6	3066	○	○	6066	△	○
67	C67	UF2 allocation detail 7	3067	○	○	6067	△	○
68	C68	UF2 allocation detail 8	3068	○	○	6068	△	○
69	C69	UF indicator allocation	3069	○	○	6069	△	○
70	C70	Detail of UF indicator allocation	3070	○	○	6070	△	○
71	C71	Bar graph indicator function selection	3071	○	○	6071	△	○
72	C72	Input broken line approximation	3072	○	○	6072	△	○
73	C73	Unused	3073	□	×	6073	□	×
74	C74	Unused	3074	□	×	6074	□	×
75	C75	RSP - C/B changeover	3075	○	○	6075	△	○
76	C76	Voltage time proportional output system	3076	○	○	6076	△	○
77	C77	Cold junction compensation	3077	○	○	6077	△	○
78	C78	S/W action in PV disconnection	3078	○	○	6078	△	○
79	C79	Voltage output 1 adjustment	3079	○	○	6079	△	○
80	C80	Voltage output 2 adjustment	3080	○	○	6080	△	○

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
81	C81	Unused	3081	○	×	6081	△	×
82	C82	Setting for extension	3082	○	×	6082	△	×
83	C83	Setting for extension	3083	○	×	6083	△	×
84	C84	Communication address	3084	○	×	6084	△	×
85	C85	Communication speed code	3085	○	×	6085	△	×
86	C86	Unused	3086	□	×	6086	□	×
87	C87	Unused	3087	□	×	6087	□	×
88	C88	Unused	3088	□	×	6088	□	×
89	C89	Unused	3089	□	×	6089	□	×
90	C90	Special function	3090	○	×	6090	△	×
91	C91	Special function	3091	○	×	6091	△	×
92	C92	Unused	3092	○	×	6092	△	×
93	C93	Special function	3093	○	×	6093	△	×
94	C94	Unused	3094	□	×	6094	□	×
95	C95	Unused	3095	□	×	6095	□	×
96	C96	Hardware type 1	3096	○	×	6096	▲	×
97	C97	Hardware type 2	3097	○	×	6097	▲	×
98	C98	ROM ID	3098	○	×	6098	▲	×
99	C99	ROM item	3099	○	×	6099	▲	×
100	C00	ROM revision	3100	○	×	6100	▲	×

5 - 3 SDC40G Communication data table

The address and read/write (R/W) enable status of each data are determined as shown in the table below.

RAM : Data address corresponding to RAM
EEPROM : Data address corresponding to EEPROM
R : READ
W : WRITE
○ : Enable
× : Disable
△ : A data address can be designated, but the data not in EEPROM, but in RAM is read.
▲ : A data address can be designated, but not the data in EEPROM, but the fixed data by ROM or H/W is read.
□ : An unused area. No data is obtained by read.

● Run status (PV, etc.) addresses

No	Item	Contents	RAM			EEPROM		
			Address	R	W	Address	R	W
1	Alarm status 1		501	○	×	3501	△	×
2	Alarm status 2		502	○	×	3502	△	×
3	Event status 1 to 8		503	○	×	3503	△	×
4	Status 1/run operation		504	○	○	3504	△	○
5	Status 2		505	○	×	3505	△	×
6	PV		506	○	×	3506	△	×
7	Current SP group		507	○	×	3507	△	×
8	Current PID group		508	○	×	3508	△	×
9	SP		509	○	×	3509	△	×
10	MV	When manual mode, MV can be written by this item.	510	○	○	3510	△	○
11	Deviation(PV-SP)		511	○	×	3511	△	×
12	Reserve		512	○	×	3512	△	×
13	Reserve		513	○	×	3513	△	×
14	Reserve		514	○	×	3514	△	×
15	RSW input status		515	○	×	3515	△	×
16	RSW function acceptance status		516	○	×	3516	△	×
17	Reserve		517	○	×	3517	△	×
18	PV·REAL		518	○	×	3518	△	×
19	PV1·RB		519	○	×	3519	△	×
20	PV1		520	○	×	3520	△	×
21	PV2·RB		521	○	×	3521	△	×
22	PV2		522	○	×	3522	△	×
23	Reserve		523	○	×	3523	△	×
24	Reserve		524	○	×	3524	△	×
25	Reserve		525	□	×	3525	□	×

No	Item	Contents			RAM			EEPROM		
		SW function	Action No.	Status	Address	R	W	Address	R	W
26	RSW function 0 action No.	Non operation	0	NOP	526	○	×	3526	△	×
27	RSW function 1 action No.	RUN/READY changeover	0 1 2	 RUN READY	527	○	×	3527	△	×
28	RSW function 2 action No.	AUTO/MAN changeover	0 1 2	Non setting AUTO MAN	528	○	×	3528	△	×
29	Reserve	Undefined	Uncertain		529	○	×	3529	△	×
30	RSW function 4 action No.	Auto tuning	0 1 2	Non setting AT stop AT start	530	○	×	3530	△	×
31	RSW function 5 action No.	Direct/reverse changeover	0 1 2	Non setting SETUP setting action SETUP opposition action	531	○	×	3531	△	×
32	RSW function 6 action No.	LSP selection	0 to 7	Selection from LSP 0 to 7	532	○	×	3532	△	×
33	RSW function 7 action No.	PID selection	0 to 7	Selection from PID 0 to 7	533	○	×	3533	△	×
34	RSW function 8 action No.	Fixed MV selection	0 1 2 3	AUTO Fixed MV 1 Fixed MV 2 Fixed MV 3	534	○	×	3534	△	×
35	RSW function 9 action No.	SP shift selection	0 to 6144	SP shift quantity selection	535	○	×	3535	△	×

● SP relation addresses

No	Display(The 3rd line indicates FUNC.)	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	S P n o □□□□□ □	LSP group No. (indicated on the FUNC indicator.)	1001	○	○	4001	△	○
2	S P □□□□□ 0	LSP0 value	1002	○	○	4002	△	○
3	S P □□□□□ 1	LSP1 value	1003	○	○	4003	△	○
4	S P n o □□□□□ 2	LSP2 value	1004	○	○	4004	△	○
5	S P n o □□□□□ 3	LSP3 value	1005	○	○	4005	△	○
6		Unused	1006	□	×	4006	□	×
7		Unused	1007	□	×	4007	□	×
8		Unused	1008	□	×	4008	□	×
9		Unused	1009	□	×	4009	□	×
10		Unused	1010	□	×	4010	□	×
11	P I d n o □ 0	PID group designation (when LSP0 is used)	1011	○	○	4011	△	○
12	P I d n o □ 1	PID group designation (when LSP1 is used)	1012	○	○	4012	△	○
13	P I d n o □ 2	PID group designation (when LSP2 is used)	1013	○	○	4013	△	○
14	P I d n o □ 3	PID group designation (when LSP3 is used)	1014	○	○	4014	△	○

● EV relation addresses

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	E1	Event 1 set value	1501	○	○	4501	△	○
2	E2	Event 2 set value	1502	○	○	4502	△	○
3	E3	Event 3 set value	1503	○	○	4503	△	○
4	E4	Event 4 set value	1504	○	○	4504	△	○
5	E5	Event 5 set value	1505	○	○	4505	△	○
6	E6	Event 6 set value	1506	○	○	4506	△	○
7	E7	Event 7 set value	1507	○	○	4507	△	○
8	E8	Event 8 set value	1508	○	○	4508	△	○
9	HYS1	Event 1 hysteresis	1509	○	○	4509	△	○
10	HYS2	Event 2 hysteresis	1510	○	○	4510	△	○
11	HYS3	Event 3 hysteresis	1511	○	○	4511	△	○
12	HYS4	Event 4 hysteresis	1512	○	○	4512	△	○
13	HYS5	Event 5 hysteresis	1513	○	○	4513	△	○
14	HYS6	Event 6 hysteresis	1514	○	○	4514	△	○
15	HYS7	Event 7 hysteresis	1515	○	○	4515	△	○
16	HYS8	Event 8 hysteresis	1516	○	○	4516	△	○
17	dL1	Event 1 on delay time	1517	○	○	4517	△	○
18	dL2	Event 2 on delay time	1518	○	○	4518	△	○
19	dL3	Event 3 on delay time	1519	○	○	4519	△	○

● PID relation addresses

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	P-0	Proportional band 0	2001	○	○	5001	△	○
2	I-0	Integral time 0	2002	○	○	5002	△	○
3	d-0	Derivative time 0	2003	○	○	5003	△	○
4	oL-0	Manipulated variable low limit 0	2004	○	○	5004	△	○
5	oH-0	Manipulated variable high limit 0	2005	○	○	5005	△	○
6	rE-0	Manual reset 0	2006	○	○	5006	△	○
7	br-0	Brake 0	2007	○	○	5007	△	○
8	dP-0	Disturbance control proportional band 0	2008	○	○	5008	△	○
9	dI-0	Disturbance control integral time 0	2009	○	○	5009	△	○
10	dd-0	Disturbance control derivative time 0	2010	○	○	5010	△	○
11	P-1	Proportional band 1	2011	○	○	5011	△	○
12	I-1	Integral time 1	2012	○	○	5012	△	○
13	d-1	Derivative time 1	2013	○	○	5013	△	○
14	oL-1	Manipulated variable low limit 1	2014	○	○	5014	△	○
15	oH-1	Manipulated variable high limit 1	2015	○	○	5015	△	○
16	rE-1	Manual reset 1	2016	○	○	5016	△	○
17	br-1	Brake 1	2017	○	○	5017	△	○
18	dP-1	Disturbance control proportional band 1	2018	○	○	5018	△	○
19	dI-1	Disturbance control integral time 1	2019	○	○	5019	△	○
20	dd-1	Disturbance control derivative time 1	2020	○	○	5020	△	○
21	P-2	Proportional band 2	2021	○	○	5021	△	○
22	I-2	Integral time 2	2022	○	○	5022	△	○
23	d-2	Derivative time 2	2023	○	○	5023	△	○
24	oL-2	Manipulated variable low limit 2	2024	○	○	5024	△	○
25	oH-2	Manipulated variable high limit 2	2025	○	○	5025	△	○
26	rE-2	Manual reset 2	2026	○	○	5026	△	○
27	br-2	Brake 2	2027	○	○	5027	△	○
28	dP-2	Disturbance control proportional band 2	2028	○	○	5028	△	○
29	dI-2	Disturbance control integral time 2	2029	○	○	5029	△	○
30	dd-2	Disturbance control derivative time 2	2030	○	○	5030	△	○
31	P-3	Proportional band 3	2031	○	○	5031	△	○
32	I-3	Integral time 3	2032	○	○	5032	△	○
33	d-3	Derivative time 3	2033	○	○	5033	△	○
34	oL-3	Manipulated variable low limit 3	2034	○	○	5034	△	○
35	oH-3	Manipulated variable high limit 3	2035	○	○	5035	△	○
36	rE-3	Manual reset 3	2036	○	○	5036	△	○
37	br-3	Brake 3	2037	○	○	5037	△	○
38	dP-3	Disturbance control proportional band 3	2038	○	○	5038	△	○
39	dI-3	Disturbance control integral time 3	2039	○	○	5039	△	○
40	dd-3	Disturbance control derivative time 3	2040	○	○	5040	△	○

● Parameter relation addresses

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	rn.ry	RUN/READY changeover	2501	○	○	5501	△	○
2	FL	Input 1 filter	2502	○	○	5502	△	○
3	rA	Input 1 ratio	2503	○	○	5503	△	○
4	bI	Input 1 bias	2504	○	○	5504	△	○
5	FL2	Input 2 filter	2505	○	○	5505	△	○
6	rA2	Input 2 ratio	2506	○	○	5506	△	○
7	bI2	Input 2 bias	2507	○	○	5507	△	○
8	cy	Time proportional output cycle (output 1)	2508	○	○	5508	△	○
9	cy2	Time proportional output cycle (output 2)(unused)	2509	○	○	5509	△	○
10	outL	Manipulated variable change limit	2510	○	○	5510	△	○
11	outr	Manipulated variable change limit (unused)	2511	○	○	5511	△	○
12	Iout	PID operation initial manipulated variable	2512	○	○	5512	△	○
13	rPId	PID operation initialize	2513	○	○	5513	△	○
14	dIFF	ON/OFF control differential	2514	○	○	5514	△	○
15	Et1	Event 1 type	2515	○	○	5515	△	○
16	Ed1	Event 1 stand-by	2516	○	○	5516	△	○
17	Et2	Event 2 type	2517	○	○	5517	△	○
18	Ed2	Event 2 stand-by	2518	○	○	5518	△	○
19	Et3	Event 3 type	2519	○	○	5519	△	○
20	Ed3	Event 3 stand-by	2520	○	○	5520	△	○
21	Et4	Event 4 type	2521	○	○	5521	△	○
22	Ed4	Event 4 stand-by	2522	○	○	5522	△	○
23	Et5	Event 5 type	2523	○	○	5523	△	○
24	Ed5	Event 5 stand-by	2524	○	○	5524	△	○
25	Et6	Event 6 type	2525	○	○	5525	△	○
26	Ed6	Event 6 stand-by	2526	○	○	5526	△	○
27	Et7	Event 7 type	2527	○	○	5527	△	○
28	Ed7	Event 7 stand-by	2528	○	○	5528	△	○
29	Et8	Event 8 type	2529	○	○	5529	△	○
30	Ed8	Event 8 stand-by	2530	○	○	5530	△	○
31	dLt	Event on delay time	2531	○	○	5531	△	○
32	r-tr	RSP tracking(unused)	2532	○	○	5532	△	○
33	SPU	LSP ramp up gradient	2533	○	○	5533	△	○
34	SPd	LSP ramp down gradient	2534	○	○	5534	△	○
35	rSPU	RSP ramp up gradient (unused)	2535	○	○	5535	△	○
36	rSPd	RSP ramp down gradient (unused)	2536	○	○	5536	△	○
37	rA-t	SP ramp unit setting	2537	○	○	5537	△	○
38	g.b.-L	Low limit of green belt	2538	○	○	5538	△	○
39	g.b.-H	High limit of green belt	2539	○	○	5539	△	○
40	M-C	Motor control selection	2540	○	○	5540	△	○

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
41	M-At	Automatic adjustment of motor opening(unused)	2541	○	○	5541	△	○
42	M-CL	Motor opening adjustment for full closing(unused)	2542	○	○	5542	△	○
43	M-OP	Motor opening adjustment for full opening(unused)	2543	○	○	5543	△	○
44	M-t	Fully open/close time in motor opening adjustment(unused)	2544	○	○	5544	△	○
45	dISP	One-digit masking in display	2545	○	○	5545	△	○
46	At	Auto tuning system	2546	○	○	5546	△	○
47	St	Smart tuning system	2547	○	○	5547	△	○
48	2PId	2 freedom degree PID selection	2548	○	○	5548	△	○
49	G-r	Variable gain/RSP ratio function selection(unused)	2549	○	×	5549	□	×
50	Gn-1	Gain 1/ratio 1(unused)	2550	□	×	5550	□	×
51	Gn-2	Gain 2/ratio 2(unused)	2551	□	×	5551	□	×
52	Gn-3	Gain 3/ratio 3(unused)	2552	□	×	5552	□	×
53	Gn-4	Gain 4/ratio 4(unused)	2553	□	×	5553	□	×
54	Gn-5	Gain 5/ratio 5(unused)	2554	□	×	5554	□	×
55	Gn-6	Gain 6/ratio 1(unused)	2555	□	×	5555	□	×
56	Gn-7	Gain 1/ratio 1(unused)	2556	□	×	5556	□	×
57	Gn-8	Gain 8(unused)	2557	□	×	5557	□	×
58	Gn-9	Gain 9(unused)	2558	□	×	5558	□	×
59	t-A.1	Input broken line approximation A1	2559	○	○	5559	△	○
60	t-A.2	Input broken line approximation A2	2560	○	○	5560	△	○
61	t-A.3	Input broken line approximation A3	2561	○	○	5561	△	○
62	t-A.4	Input broken line approximation A4	2562	○	○	5562	△	○
63	t-A.5	Input broken line approximation A5	2563	○	○	5563	△	○
64	t-A.6	Input broken line approximation A6	2564	○	○	5564	△	○
65	t-A.7	Input broken line approximation A7	2565	○	○	5565	△	○
66	t-A.8	Input broken line approximation A8	2566	○	○	5566	△	○
67	t-A.9	Input broken line approximation A9	2567	○	○	5567	△	○
68	t-A.A	Input broken line approximation A10	2568	○	○	5568	△	○
69	t-A.b	Input broken line approximation A11	2569	○	○	5569	△	○
70	t-b.1	Input broken line approximation B1	2570	○	○	5570	△	○
71	t-b.2	Input broken line approximation B2	2571	○	○	5571	△	○
72	t-b.3	Input broken line approximation B3	2572	○	○	5572	△	○
73	t-b.4	Input broken line approximation B4	2573	○	○	5573	△	○
74	t-b.5	Input broken line approximation B5	2574	○	○	5574	△	○
75	t-b.6	Input broken line approximation B6	2575	○	○	5575	△	○
76	t-b.7	Input broken line approximation B7	2576	○	○	5576	△	○
77	t-b.8	Input broken line approximation B8	2577	○	○	5577	△	○
78	t-b.9	Input broken line approximation B9	2578	○	○	5578	△	○
79	t-b.A	Input broken line approximation B10	2579	○	○	5579	△	○
80	t-b.b	Input broken line approximation B11	2580	○	○	5580	△	○

● Parameter 2 relation addresses

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	Mod	Modulation type	2601	○	○	5601	△	○
2	dc	Decay time	2602	○	○	5602	△	○
3	cH2	PV 2CH changeover type	2603	○	○	5603	△	○
4	cP	PV 2CH changeover point	2604	○	○	5604	△	○
5	cb	PV 2CH dead zone changeover width	2605	○	○	5605	△	○
6	Eb	Monitor trigger event action width	2606	○	○	5606	△	○
7	t-c.1	Input broken line approximation C1	2607	○	○	5607	△	○
8	t-c.2	Input broken line approximation C2	2608	○	○	5608	△	○
9	t-c.3	Input broken line approximation C3	2609	○	○	5609	△	○
10	t-c.4	Input broken line approximation C4	2610	○	○	5610	△	○
11	t-c.5	Input broken line approximation C5	2611	○	○	5611	△	○
12	t-c.6	Input broken line approximation C6	2612	○	○	5612	△	○
13	t-c.7	Input broken line approximation C7	2613	○	○	5613	△	○
14	t-c.8	Input broken line approximation C8	2614	○	○	5614	△	○
15	t-c.9	Input broken line approximation C9	2615	○	○	5615	△	○
16	t-c.A	Input broken line approximation C10	2616	○	○	5616	△	○
17	t-c.b	Input broken line approximation C11	2617	○	○	5617	△	○
18	t-d.1	Input broken line approximation D1	2618	○	○	5618	△	○
19	t-d.2	Input broken line approximation D2	2619	○	○	5619	△	○
20	t-d.3	Input broken line approximation D3	2620	○	○	5620	△	○
21	t-d.4	Input broken line approximation D4	2621	○	○	5621	△	○
22	t-d.5	Input broken line approximation D5	2622	○	○	5622	△	○
23	t-d.6	Input broken line approximation D6	2623	○	○	5623	△	○
24	t-d.7	Input broken line approximation D7	2624	○	○	5624	△	○
25	t-d.8	Input broken line approximation D8	2625	○	○	5625	△	○
26	t-d.9	Input broken line approximation D9	2626	○	○	5626	△	○
27	t-d.A	Input broken line approximation D10	2627	○	○	5627	△	○
28	t-d.b	Input broken line approximation D11	2628	○	○	5628	△	○

● SETUP relation addresses

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
1	C1	Keylock	3001	○	○	6001	△	○
2	C2	Control action	3002	○	○	6002	△	○
3	C3	Unused	3003	○	○	6003	△	○
4	C4	Unused	3004	○	○	6004	△	○
5	C5	Unused	3005	○	×	6005	△	×
6	C6	Input type 1 range type	3006	○	○	6006	△	○
7	C7	Unused	3007	○	×	6007	△	×
8	C8	Input 1 0% setting	3008	○	○	6008	△	○
9	C9	Input 1 100% setting	3009	○	○	6009	△	○
10	C10	Unused	3010	○	×	6010	△	×
11	C11	Input 2 range type	3011	○	○	6011	△	○
12	C12	Unused	3012	○	○	6012	△	○
13	C13	Input 2 0% setting (0% = 4mA/1V)	3013	○	○	6013	△	○
14	C14	Input 2 100% setting (100% = 20mA/5V)	3014	○	○	6014	△	○
15	C15	Unused	3015	○	×	6015	△	×
16	C16	LSP setting system	3016	○	○	6016	△	○
17	C17	Low limit of SP limit	3017	○	○	6017	△	○
18	C18	High limit of SP limit	3018	○	○	6018	△	○
19	C19	Manipulated variable setting in PV overrange	3019	○	○	6019	△	○
20	C20	Manipulated variable in PV overrange	3020	○	○	6020	△	○
21	C21	Manual change mode	3021	○	○	6021	△	○
22	C22	Preset manual manipulated variable	3022	○	○	6022	△	○
23	C23	Manipulated variable of RSW fixed MV1	3023	○	○	6023	△	○
24	C24	Manipulated variable of RSW fixed MV2	3024	○	○	6024	△	○
25	C25	Manipulated variable of RSW fixed MV3	3025	○	○	6025	△	○
26	C26	READY manipulated variable	3026	○	○	6026	△	○
27	C27	Unused	3027	○	○	6027	△	○
28	C28	READY event	3028	○	○	6028	△	○
29	C29	Unused	3029	○	○	6029	△	○
30	C30	Unused	3030	○	○	6030	△	○
31	C31	Unused	3031	○	○	6031	△	○
32	C32	Auxiliary output 1 type	3032	○	○	6032	△	○
33	C33	Auxiliary output 1 4mA setting	3033	○	○	6033	△	○
34	C34	Auxiliary output 1 20mA setting	3034	○	○	6034	△	○
35	C35	Auxiliary output 1 READY output	3035	○	○	6035	△	○
36	C36	Auxiliary output 1 preset READY output value	3036	○	○	6036	△	○
37	C37	Auxiliary output 2 type	3037	○	○	6037	△	○
38	C38	Auxiliary output 2 4mA setting	3038	○	○	6038	△	○
39	C39	Auxiliary output 2 20mA setting	3039	○	○	6039	△	○
40	C40	Auxiliary output 2 READY output	3040	○	○	6040	△	○

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
41	C41	Auxiliary output 2 preset READY output value	3041	○	○	6041	△	○
42	C42	RSW1 allocation	3042	○	○	6042	△	○
43	C43	RSW2 allocation	3043	○	○	6043	△	○
44	C44	RSW3 allocation	3044	○	○	6044	△	○
45	C45	RSW4 allocation	3045	○	○	6045	△	○
46	C46	RSW5 allocation	3046	○	○	6046	△	○
47	C47	RSW6 allocation	3047	○	○	6047	△	○
48	C48	RSW7 allocation	3048	○	○	6048	△	○
49	C49	RSW8 allocation	3049	○	○	6049	△	○
54	C54	RSW LSP shift width	3054	○	○	6054	△	○
55	C55	UF1 key allocation	3055	○	○	6055	△	○
56	C56	UF1 allocation detail 1	3056	○	○	6056	△	○
57	C57	UF1 allocation detail 2	3057	○	○	6057	△	○
58	C58	UF1 allocation detail 3	3058	○	○	6058	△	○
59	C59	UF1 allocation detail 4	3059	○	○	6059	△	○
60	C60	UF2 key allocation	3060	○	○	6060	△	○
61	C61	UF2 allocation detail 1	3061	○	○	6061	△	○
62	C62	UF2 allocation detail 2	3062	○	○	6062	△	○
63	C63	UF2 allocation detail 3	3063	○	○	6063	△	○
64	C64	UF2 allocation detail 4	3064	○	○	6064	△	○
65	C65	UF2 allocation detail 5	3065	○	○	6065	△	○
66	C66	UF2 allocation detail 6	3066	○	○	6066	△	○
67	C67	UF2 allocation detail 7	3067	○	○	6067	△	○
68	C68	UF2 allocation detail 8	3068	○	○	6068	△	○
69	C69	UF indicator allocation	3069	○	○	6069	△	○
70	C70	Detail of UF indicator allocation	3070	○	○	6070	△	○
71	C71	Bar graph indicator function selection	3071	○	○	6071	△	○
72	C72	Input broken line approximation	3072	○	○	6072	△	○
73	C73	For input broken line approximation	3073	○	○	6073	△	○
74	C74	Unused	3074	□	×	6074	□	×
75	C75	Unused	3075	○	○	6075	△	○
76	C76	Unused	3076	○	○	6076	△	○
77	C77	Cold junction compensation	3077	○	○	6077	△	○
78	C78	Unused	3078	○	○	6078	△	○
79	C79	Unused	3079	○	○	6079	△	○
80	C80	Unused	3080	○	○	6080	△	○

No	Display	Item	RAM			EEPROM		
			Address	R	W	Address	R	W
81	C81	Unused	3081	○	○	6081	△	○
82	C82	Setting for extension	3082	○	○	6082	△	○
83	C83	Setting for extension	3083	○	○	6083	△	○
84	C84	Communication address	3084	○	×	6084	△	×
85	C85	Communication speed code	3085	○	×	6085	△	×
86	C86	Unused	3086	□	×	6086	□	×
87	C87	Unused	3087	□	×	6087	□	×
88	C88	Unused	3088	□	×	6088	□	×
89	C89	Unused	3089	□	×	6089	□	×
90	C90	Special function	3090	○	×	6090	△	×
91	C91	Special function	3091	○	×	6091	△	×
92	C92	Unused	3092	□	×	6092	□	×
93	C93	Special function	3093	○	×	6093	△	×
94	C94	Unused	3094	□	×	6094	□	×
95	C95	Unused	3095	□	×	6095	□	×
96	C96	Hardware type 1	3096	○	×	6096	▲	×
97	C97	Hardware type 2	3097	○	×	6097	▲	×
98	C98	ROM ID	3098	○	×	6098	▲	×
99	C99	ROM item	3099	○	×	6099	▲	×
100	C00	ROM revision	3100	○	×	6100	▲	×

5 - 4 Common Bit Information data

● Bit information data

№1 Alarm 1(Address RAM:501W, EEPROM:3501W)

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
⑯	⑮	⑭	⑬	⑫	⑪	⑩	⑨	⑧	⑦	⑥	⑤	④	③	②	①

Each bit 0:OFF , 1:ON

①:AL01 AI1 overrange	⑤:AL05 AI3 overrange	⑨:AL09 RTD disconnection	⑬:AL13 DGS disconnection
②:AL02 AI1 underrange	⑥:AL06 AI3 underrange	⑩:AL10 MFB disconnection	⑭:AL14
③:AL03 AI2 overrange	⑦:AL07 RTD disconnection	⑪:AL11 MFB short circuit disable	⑮:AL15
④:AL04 AI2 underrange	⑧:AL08 RTD disconnection	⑫:AL12 MFB adjustment	⑯:AL16

№2 Alarm 2(Address RAM:502W, EEPROM:3502W)

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
⑯	⑮	⑭	⑬	⑫	⑪	⑩	⑨	⑧	⑦	⑥	⑤	④	③	②	①

Each bit 0:OFF , 1:ON

①:AL70 A/D1 fault	⑤:AL74	⑨:AL82 PV1/2 setting error	⑬:AL96
②:AL71 A/D2 fault	⑥:AL75	⑩:AL83	⑭:AL97 Parameter error
③:AL72	⑦:AL80 Output configuration error	⑪:AL94	⑮:AL98 Adjustment value error
④:AL73	⑧:AL81	⑫:AL95	⑯:AL99 ROM error

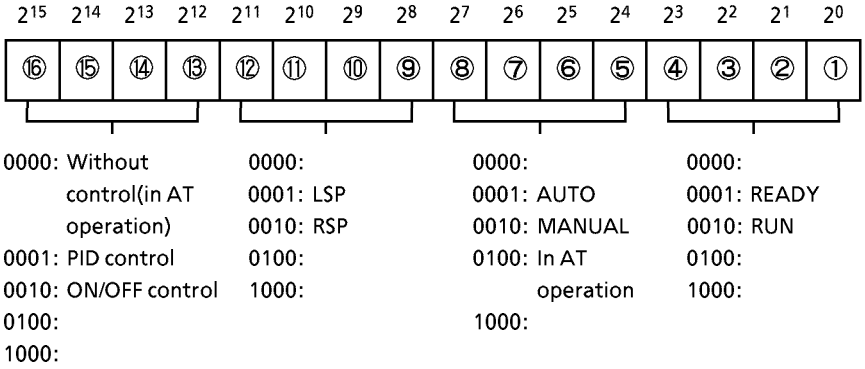
№3 Event output status(Address RAM:503W, EEPROM:3503W)

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
⑯	⑮	⑭	⑬	⑫	⑪	⑩	⑨	⑧	⑦	⑥	⑤	④	③	②	①

Each bit 0:OFF , 1:ON

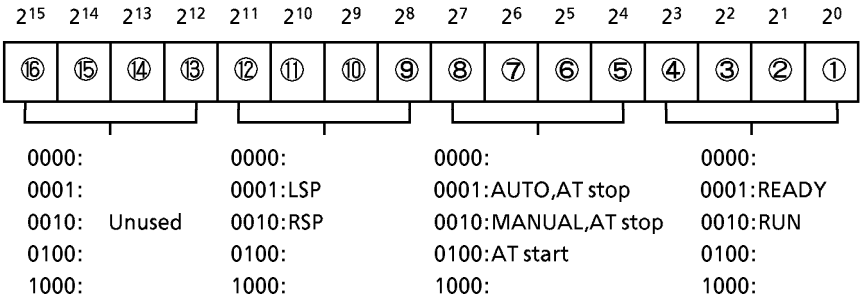
①:Event1	⑤:Event5	⑨:Unused	⑬:Unused
②:Event2	⑥:Event6	⑩:Unused	⑭:Unused
③:Event3	⑦:Event7	⑪:Unused	⑮:Unused
④:Event4	⑧:Event8	⑫:Unused	⑯:Unused

№4 Status 1 (Address RAM:504W, EEPROM:3504W)
This bit information data has individual meanings every 4 bits, as shown below.
(1)Status 1 read



Note) The local SP status only is effective when the SDC40A is put in computer backup mode. (Whether the computer backup function is remote or local can be read by the RSW function 11.)

(2)Status 1 write



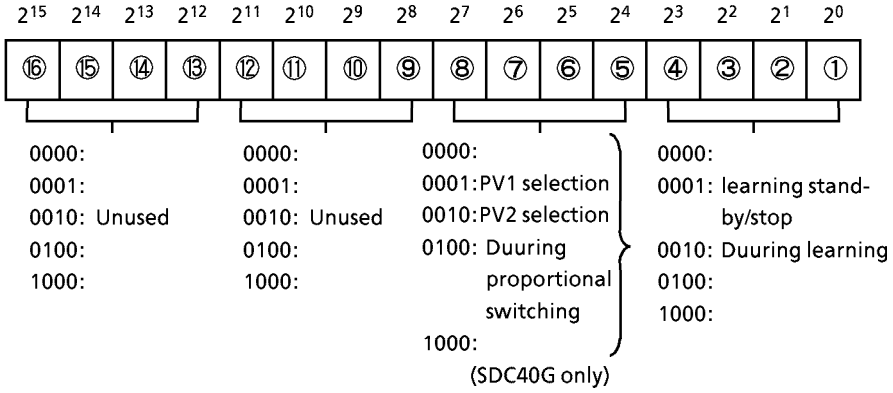
As for the status write command, set only the bits of request to be used to 1. The WS command can then be used.
Example)

① Set the READY mode.	WS,504W,1
②Set the RUN mode.	WS,504W,2
③ Set the AUTO mode.(Stop AT.)	WS,504W,16
④ Set the MANUAL mode.(Stop AT.)	WS,504W,32
⑤ Start AT.	WS,504W,64
⑥ Set the LSP mode.	WS,504W,256
⑦ Set the RSP mode.	WS,504W,512

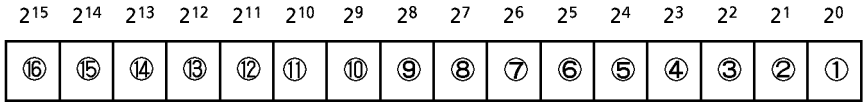
№5 Status 2 (Address RAM:505W, EEPROM:3505W)

This bit information data has individual meanings every 4 bits, as shown below.

Status 2 read



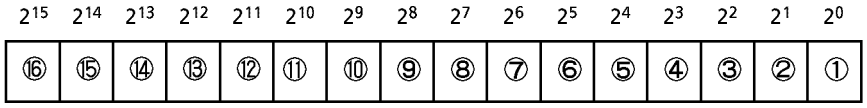
№6 RSW input status(Address RAM:515W, EEPROM:3515W)



Each bit 0:OFF 1:ON

①:RSW1	⑤:RSW5	⑨:RSW9	⑬:Unused
②:RSW2	⑥:RSW6	⑩:RSW10	⑭:Unused
③:RSW3	⑦:RSW7	⑪:RSW11	⑮:Unused
④:RSW4	⑧:RSW8	⑫:RSW12	⑯:Unused

№7 RSW function acceptance status (Address RAM:516W, EEPROM:3516W)



Each bit 0:Not accepted (without setting) 1:Accepted (with setting)

①:RSW function 0 NOP	⑤:RSW function 4 AT	⑨:RSW function 8 Fixed MV selection	⑬:RSW function 12 Slave LSP selection
②:RSW function 1 RUN/READY	⑥:RSW function 5 Direct/reverse action	⑩:RSW function 9 LSP shift	⑭:Unused
③:RSW function 2 AUTO/MAN	⑦:RSW function 6 LSP No. selection	⑪:RSW function 10 RSP/internal RSP ratio	⑮:Unused
④:RSW function 3 LOC/REM	⑧:RSW function 7 PID No. selection	⑫:RSW function 11 Computer backup	⑯:Unused

6. Communication for master station

■ Precautions for programming

- The longest response time of the instrument is 2sec.
  Therefore, the response monitor time should be set to 2sec.
- If no response is obtained within 2sec, retransmit the same message. When no response remains coming even after making retransmission twice, it should be regarded as a communication error.
- The above-mentioned retransmission is required since a message may not be properly transmitted due to noise or the like during communication.

🕮 Note

When the device distinction codes "X" and "x" are used alternately during message retransmission from the master station, the received response message can be conveniently identified to be the latest message or preceding one.

7. Troubleshooting

■ Check items in case communication is disabled

(1) Check whether the RS-232C wiring or RS-485 wiring is wrong or not.

(2) Check it the communication conditions for the SDC40A/40G instrument and reet those for the host computer.
If any one of the below setting items is different between both stations, communication is disabled.
The underlined items mean that they can be set on the SDC40A/40G side.

Transmission speed	: 4800、 9600bps
Data length	: 7, 8, bits
Parity	: No parity, odd parity, even parity
Stop bit	: 1 stop bit, 2 stop bits

(3) Check if the destination address of the command frame transmitted from the host computer meets the address set to the SDC40A/SDC40G.
The address of the SDC40A/SDC40G is set to 0 at delivery from the factory. Even when the destination address of the command frame is set to 00 (30H, 30H), the SDC40A/SDC40G does not respond to such a message.

(4) Use the upper-case character codes for all the character codes other than the device distinction code ("X" or "x" in this instrument).

8. Specifications

■ RS-232C Specifications

Name	Remarks
Transmission mode	Unbalanced type
Transmission line	3-wires system
Signal level	Input data 0 +3V min. Input data 1 −3V max. Output data 0 +5V min. Output data 1 −5V max.
Transmission speed (bps)	4800、9600
Transmission distance	15m max.
Communication system	Half duplex
Synchronous method	Start/stop transmission
Data format	8 data bits, 1 stop bit, even parity 8 data bits, 2 stop bits, no parity
Error detection	Parity check, check-sum
Communication address	0 to 127 (Communication functions are disabled when set to 0.)
Network type	1:1

■ RS-485 Specifications

Name	Remarks
Transmission mode	Balanced type
Transmission line	5-wires system/3-wire system
Signal level	Input data 0 −0.2V max. Input data 1 +1V min. Output data 0 −0.2V max. Output data 1 +2V min.
Transmission speed (bps)	4800、9600
Transmission distance	500m max. (300m when connected with the MA500 DIGITRONIK interface module(DIM))
Communication system	Half duplex
Synchronous method	Start/stop transmission
Data format	8 data bits, 1 stop bit, even parity 8 data bits, 2 stop bits, no parity
Error detection	Parity check, check-sum
Communication address	0 to 127 (Communication functions are disabled when set to 0.)
Network type	1:N (up to 31units, or up to 16 units when connected with MA500 DIM or CMC410)

Appendix

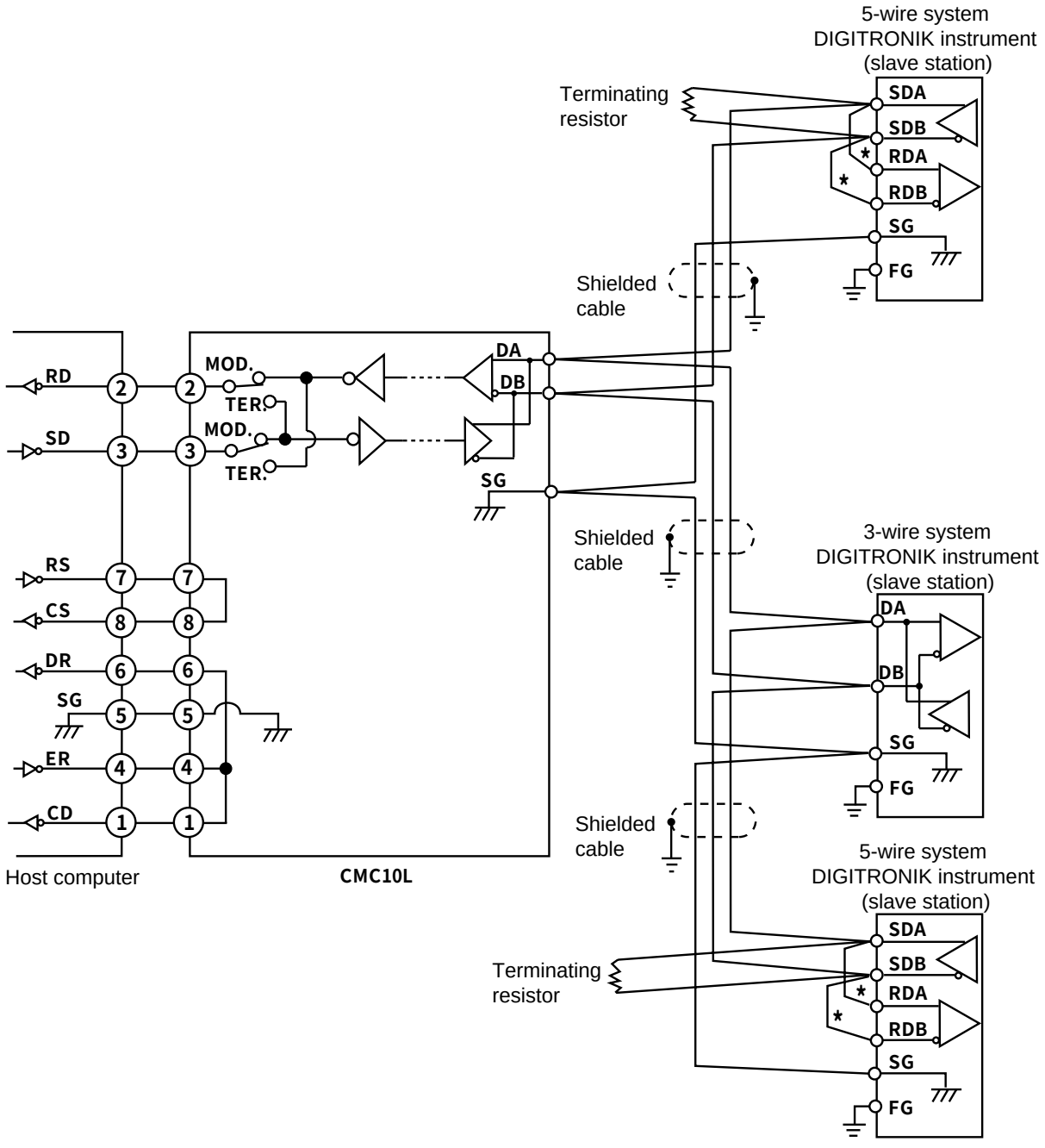
■ Code table

UPPER / LOWER	0	1	2	3	4	5	6	7
0			SPACE	0	@	P	`	p
1			!	1	A	Q	a	q
2	STX		"	2	B	R	b	r
3	ETX		#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A	LF		*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	\	l	|
D	CR		−	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

The shaded part ( ) is not used for this communication system.
(The codes to be used change every station.)

■ Connection with CMC10L

The CMC10L001A000 is available as an RS-232C/RS-485 (3-wire system) converter from Yamatake Corporation. The following diagram shows an example of wiring using a straight cable for a host computer in the terminal mode:



Connect two terminating resistors of 150Ω±5%, 1/2W min. to the instrument at each end of the transmission line.

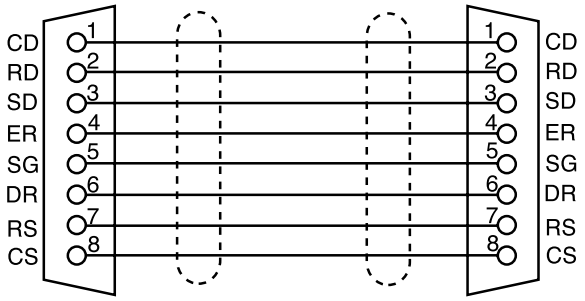
Conduct the wiring externally for the wires marked with an asterisk.

Connect the master station SD to the slave station RD, and the master station RD to the slave station SD.
To execute this connection, set the MODE switch provided in the CMC10L as shown in the following table in accordance with the host computer side RS-232C connector pin arrangement (modem/terminal) and the type of cable (cross/straight) used:

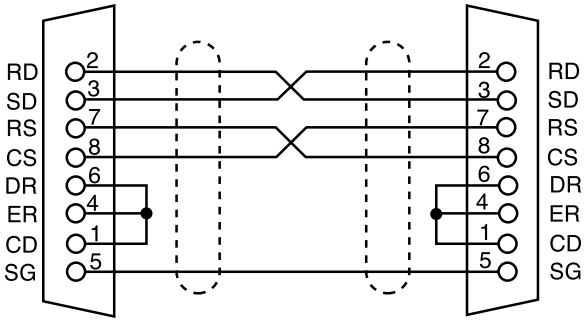
RS-232C	Cable type	MODE switch
TERMINAL	Straight	MODEM
TERMINAL	Cross	TERMINAL
MODEM	Straight	TERMINAL
MODEM	Cross	MODEM

- **RS-232C cable**

Straight: An RS-232C cable with a D-Sub (9-pin) connector at each end where pins with the same number are mutually connected (for example, pin (2) to pin (2), and pin (3) to pin (3))

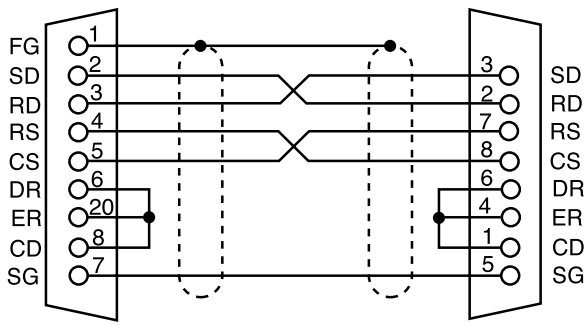


Cross: An RS-232C cable with a D-Sub (9-pin) connector at each end where different number pins are connected (for example, pin (2) to pin (3), and pin (3) to pin (2))



D-Sub (25-pin) – D-Sub (9-pin) conversion cable:

An RS-232C cable for conversion between D-Sub (25-pin) and D-Sub (9-pin)



Revision History

Printed Date	Manual Number	Edition	Revised pages	Description
94-06	**CP-UM-1583E**	**1st Edition**		
98-10		**2nd Edition**	2-1 8-1	RS-232C communication cable has been changed. Baud rate to Transmission speed Character synchronization method to Synchronous method
01-05		**3rd Edition**	Positioning of this instruction manual 1-1 2-1 to 2-4 Appendix2 to 3 4-14 5-5, 5-16 5-29 6-2 to 6-5 Appendix4	Format changed CP-UM-1580E-A4 deleted CMA50A105 to CMC10L RS-232C and RS-485 connection diagrams changed. Deleted CMA50 from the explanation No10:MV of contents added (2)Status 2 write deleted Sample program deleted Page deleted
03-06		**4th Edition**	1-1 2-1 4-3 4-4 7-1 Appendix3	RESTRICTIONS ON USE changed. Changed description of the CPL communications. Conversion connector part No:81408811-001 deleted The character codes of a check-sum was corrected 35H,5 to 41H, A. The character codes of a check-sum was corrected 7BH to 76H, 85H to 8AH, 8A to 8H, 35H to 41H. Explanation of No. 2 was clarified. RD and SD of a straight cable and crossing cable were replaced.

YAMATAKE

Specifications are subject to change without notice.

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